

**WEST VIRGINIA
GEOLOGICAL SURVEY**



GENERAL METALLURGICAL DEPARTMENT


COAL, COKE & BY-PRODUCT

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PLATE I.—Falls of Hominy Creek over Lower Guyandot Sandstone at Hominy Falls Post-Office.
Photo by E. E. Harris.

WEST VIRGINIA
GEOLOGICAL SURVEY



NICHOLAS COUNTY

By

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I. C. WHITE, State Geologist

1921



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1921

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- J. LEWIS WILLIAMS.....*Chief Clerk*
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LETTER OF TRANSMITTAL.

To His Excellency, Hon, E. F. Morgan, Governor of West Virginia, and President of the West Virginia Geological Survey Commission:

SIR: I have the honor to transmit herewith the detailed report and accompanying topographic and geologic maps of Nicholas County. The field work as well as the preparation of the report thereon is largely the result of Mr. Reger's careful and skillful labor assisted by Mr. Tucker especially in the preparation of the geologic and other maps and the calculation of the areas and tonnage of the several important coal beds. Dr. Armstrong Price also assisted for a few weeks in the field work.

Nicholas County generally has not yet had the advantage of easy and direct access to our great trunk line railways, and hence its coal development has only just begun. The Kanawha and Michigan Railway and the Chesapeake and Ohio are entering the County on its southwestern border, the Baltimore and Ohio through its Richwood Branch gives access to the northeastern portion of the county, while the eastern portion of its northern margin is tapped by the Buffalo Creek and Gauley Railway going out to the B. & O.'s Coal and Coke division at Dundon on Elk River. Both the B. & O. and the K. & M. Railways have extension lines projected along Gauley River, and whenever one or both of these are constructed, the real development of the rich coal fields of the county will begin in earnest.

Three important coal formations extend entirely across the county from northeast to southwest. First, the New River Group makes a broad band across the eastern portion, but thins away beyond commercial thickness a short distance west from Gauley River; Second, the Kanawha Group of coals with only a small area east from Gauley, sets in along the Gauley hills and extends under all of the area westward to and beyond the northwestern border of the county, while capping the summits above in a broad belt come the basal members of the Allegheny Series of coals, one of which, the Lower Kittanning or No. 5 Block is the very persistent, and splendid coal mined so extensively at Widen

on the Nicholas-Clay County border. The most important coal of the New River Group in Nicholas appears to be the famous Sewell bed being the one now mined at Fenwick and other points near Richwood, while a few miles southeast from the latter town, a still lower bed, (probably the Fire Creek) attains commercial proportions and is mined for use by the woodworking industries of the town. In the Kanawha Group, the Stockton, Coalburg, Winifrede, No. 2 Gas, and Eagle beds appear to furnish commercial coal in many regions of the county, so that a very large tonnage (6 billion in round numbers according to Mr. Tucker's figures) of most excellent coal awaits the coming of railways and branch lines along the streams which give access to these virgin coal fields on either side of Gauley River, where there yet remain very large areas of uncut forests of both hard and soft woods.

The rapid descent of Gauley River and that of its principal tributaries, Williams, Cranberry, Cherry, etc., should be utilized in the generation of electric power with which to prolong to a distant day the exhaustion of our precious coal supply. This potential electric power is the only inexhaustible one, since it is constantly renewed by every rain, and it should be utilized in order to husband our exhaustible resources of coal. Aside from clays, brick shales, building stones, and possibly glass-sands, Nicholas County contains no other valuable minerals besides her rich coal deposits.

I. C. WHITE, *State Geologist.*

Morgantown, W. Va., September 1, 1921.

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AUTHOR'S PREFACE.

This book is a general geological report on Nicholas County. As exhibited by the Table of Contents, it contains a short Historical and Industrial sketch, a chapter on Physiography, a chapter on Structure, five chapters on Stratigraphy, four chapters on Mineral Resources, and a chapter on Paleontology, as well as an appendix giving all available spirit-level bench marks and railroad levels.

In order to describe the several coals and the oil and gas sands in their proper stratigraphic sequence, it was necessary to make an exhaustive study of the entire rock system, both surface and underground, as deep as information was available, the results of which are embodied in the text in the form of geologic sections and detailed descriptions. Some of this matter may not be of interest to the casual reader but its value to professional men, conducting future coal, oil, and gas operations in the county, can not be questioned and its publication is therefore justified. In each geologic section certain physical facts, including thicknesses, intervals, colors, and general characteristics of rock strata and coals, are presented just as obtained by careful research in the field, which, except for minor errors can not be changed by subsequent investigation. These facts are followed by the author's interpretation or correlation, based in some cases on opinion where certain essential facts are lacking, and some of these will doubtless require revision after more detailed researches and prospects have been made by future workers in particular localities. On all such points the author will welcome kindly criticism and suggestions, as the aim has been to give all available facts and to draw conclusions based on present knowledge, which in many places is incomplete, owing to concealed strata, or to the lack of prospects or borings or other essential data.

Two maps accompany the Report in a separate atlas, Map I showing the Topography and Map II showing the Geology. Map I is assembled and photolithographed from

the standard topographic quadrangles, as surveyed and published by the United States Geological Survey in cooperation with the West Virginia Geological Survey, certain additions and corrections, principally railroads and place names being added by the author. Map II, made up from the same base, gives not only the outcrops of the various series and minable coals but also shows by numbers the exact location of all tests for oil and gas, coal test borings, and coal openings 1 to 1280, inclusive, as numbered and described in the text. Besides these separate maps, 22 figures appear in the text, of which Nos. 5 to 21, inclusive, are intended to show at a glance where the several coal seams are of minable thickness and purity. Since many of these coals are too thin or impure to be minable in certain regions, it has been necessary to show approximate lines of disappearance, in referring to which it must be remembered that there are probably small areas of good coal on the barren side and corresponding areas where the coal is worthless on the other side of the line. In some instances where the coals are known to be patchy over considerable areas, this condition is shown by breaks in the line shading. Wherever possible detailed information should be sought from openings or borings published in the text.

The author spent the summer and fall season of 1917 making the necessary field researches for this volume, having been assisted for several weeks by Dr. W. Armstrong Price, Paleontologist, who, in addition to his fossil collecting, was able to devote considerable time to economic investigation, his work in the latter field having been mainly in Summersville, Hamilton, and Beaver Districts.

In addition to the above investigations the value of the chapter on Commercial Coal has been much enhanced by the publication of many sections and analyses made by or for the Tioga Lumber Company, the same having been most kindly presented the Survey by its president, Mr. Leonard Harrison, and its mining engineer, Mr. George A. Harrison, whose work in prospecting and mapping a large tract of land in Hamilton and Beaver Districts was exceptionally well done. The Survey is indebted also to Mr. C. E. Krebs,

Mining Engineer and Geologist, for the locations, elevations, and records of several important coal borings made under his direction since the completion of field work. Many other valuable sections, analyses, and records were secured from other sources, due acknowledgment having been made in the text. It is manifestly impossible to make detailed mention of the great number of Nicholas County citizens who most generously furnished entertainment and local guidance, often at personal inconvenience to themselves, but to all of these special acknowledgment is made both personally and in the name of the State whose interest was served.

Part IV, treating of the Paleontology, is the work of Dr. W. Armstrong Price, Paleontologist, the collections having been made partly by him and partly by the writer.

The chemical analyses and calorific tests, except as otherwise specified in the text, were made by J. B. Krak, Assistant Chemist, working under the direction and with the assistance of B. H. Hite, Chief Chemist, in the laboratory of the Survey.

Credit is due to R. C. Tucker, Engineer and Field Assistant, and James D. Sisler, Temporary Field Assistant, for office assistance in preparing the Report, most of the figures and the geologic details on Map II, as well as a large amount of statistical matter of the text, proof-reading, and indexing having been done by the former, while the latter assisted Mr. Tucker in the arduous labor of assembling the numerous coal sections in standard form ready for insertion in the text. Credit is also due to Miss Marie Stenger, Stenographer, for the transcription of the manuscript, a work of no small importance.

Finally, as in many previous Reports, the author takes pleasure in expressing his obligation to Dr. I. C. White, State Geologist, whose constant supervision and valuable suggestions have added greatly to the value of this Report.

DAVID B. REGER.

Morgantown, W. Va., March 25. 1920.

ERRATA.

- Page 24, 4th line from top, for "5 4 43r 79.6 3.3 1.64" read "1.4 6r 43.6 1.1 1.27."
- Page 66, under date of Nov. 2, for "330" read "3.39."
- Page 66, under date of Dec. 11, for "390", read "3.99."
- Page 96, Interval of Lower Douglas Coal at Richwood, for "395", read "335".
- Page 206, 3rd line from top, above *Sandstone, Homewood*, insert *Kanawha Group (1200)'*.
- Page 214, 10th line from bottom, for "north of Mill Creek, 1.9 miles N. 39°," read "east of Cabin Run of Anthony Creek."
- Page 274, line 16 from bottom, delete "*Sandstone, 1 ft. 2 in.*".
- Page 281, lines 5 and 6 from top, for "in ridge road east of Muddlety Creek, 2.9 miles N. 57° E. of Summersville; Cedar Coal; elevation 2080' B", read "in road on ridge road east of Muddlety Creek, 2.5 miles N. 55° E. of Summersville; Cedar Coal; elevation, 2030' B."
- Page 301, line 4 from bottom, for "McMillion," read "McMillon."
- Page 304, line 8 from bottom, for "Beaver Creek," read "Beaver District."
- Page 375, for total depth of well No. 31 in table—"3743," read "3753."
- Page 394, line 12 from bottom, for "Casting", read "Casing".
- Page 408, under columns headed "No on Map II" and "Name of Property," transfer Nos. 27 and 28 in numerical order. The information in following columns will then be correct.
- Page 432, line 20 from bottom, for "seiton", read "section".
- Page 411, line 7 from bottom, for "3 (ft) 4 (in.)," read "3(ft.) 5 (in.)," (Thickness of seam).
- Page 451, line 7 from bottom, for "1765 ", read "1765".
- Page 453, line 16 from top, for "unpavement," read "pavement".
- Page 466, line 3 from top for "Gilboat", read "Gilboa".
- Page 467, line 17 from bottom, for "dlety", read "dlety".
- Page 474, line 8 from bottom, for "1710 B.", read "1710' B.".
- Page 478, line 3 from bottom, for "hant", read "Shant".
- Page 493, line 7 from top, add "of Coal Analyses" at beginning of line.
- Page 494, line 7 from top, for "office" read "office".
- Page 494, lines 7 and 8 from top, for "Henson", read "Henderson".
- Page 498, line 21 from bottom, for "8,999,147,620", read "8,999,147,520".
- Page 509, bottom line, for "53.06", read "53.00" (square miles).
- Page 515, line 5 from bottom, for "Bu"lo", read "Buffalo".
- Page 523, line 8 from bottom, for "Stoccon", read "Stockton".
- Page 559, line 17 from top, for "1 (ft) 6 (in.)," read "1 (ft.) 3 (in.)."
- Page 564, Insert in black italics, at top of page—"Chilton Coal, Jefferson District".
- Page 564, 3rd line from top, for "have", read "having".
- Page 569, 3rd line from top, add "county" at end of line.
- Page 572, 12th line from bottom, for "(No. 296R)", read "(No. 284R)".
- Page 572, transfer 6th line from bottom to bottom of page.
- Page 574, 17th line from bottom, for "Coa.", read "Coal".
- Page 576, 18th line from bottom, for "page ???", read "page 271-2".
- Page 588, 2nd line from bottom, for "Campdell", read "Campbell".
- Page 611, line 6 from top (black italics) to replace line 15 after correcting "Caal" to read "Coal". Line 6 to read: "Along ridge road, 1.3 miles east of Calvin; Campbell Creek (No. 2)".
- Page 611, line 18 from top, for "Brocks's", read "Brocks".
- Page 621, line 19 from top, for "4 4'", read "4' 4"''".
- Page 627, add between lines 2 and 3 from top the following line: "6 Slate, black 0 1'".
- Page 631, line 2 from bottom, for "detroit", read "details".
- Page 646, line 15 from top, for "ooser:ation", read "observation".
- Page 681, line 9 from bottom for "Quanty", read "Quantity" (in black italics).
- Page 679, line 12 from bottom, delete comma (,) after Coal (black italics).

ERRATA—(Continue-d)

- Page 713, line 18 from top, for "wset", read "west".
- Page 722, first column heading, for "No. on No. on", read "No. on Map II".
- Pages 728 and 729, second column heading, for "No. Sample", read "Sample No.".
- Page 732, line 6 from top, for "Loure Freeport", read "Lower Freeport".
- Page 732, transpose descriptions of location and page references for Mines Nos. 190 and 192, lines 7 and 6 from bottom (half lines).
- Page 736, for "a" in foot-note, read "a".
- Page 748, for thickness of Lower Mahoning Sandstone, read "25 to 40" instead of "30 to 40."
- Page 752, line 3 from top, for "Pennsylvania", read "Pennsylvanian".
- Page 765, top line, for "Cuonty", read "County".
- Page 764, line 29 from bottom, for "pottsvillian", read "pottsvilliana".
- Page 770, lines 19 and 18 from bottom, for "ba-ometer", read "barometer".
- Page 773, lines 8 and 7 from bottom, for "Capu-liformis", read "capu-liformis".
- Page 777, line 3 from top, for "Discina", read "Discina".
- Page 778, line 2 from top, for "semireticulatus", read "semireticulatus".
- Page 785, line 5 from top should be in 8-point type.
- Page 785, line 10 from top, for "Illnois", read "Illinois".
- Page 785, line 13 from bottom, for "1686", read "1866".
- Page 788, add between lines 2 and 3 at top the word "Page" over column of figures at right.
- Page 795, line 24 from bottom, for "Hookersville", read "Hookersville".
- Page 797, line 12 from top, for "tsamped", read "stamped".

NOTE.—Owing to the unusual circumstances existing in the plant of the printer at the time of publication, several other minor errors not affecting the sense also appear in the text. The book has been in press for nearly 2 years, and rather than delay its issue longer by resetting portions of the index, two styles of type will be found there.—I. C. W.

PART I.

History and Physiography.

CHAPTER I.

HISTORICAL AND INDUSTRIAL DEVELOPMENT

LOCATION.

Nicholas County, comprising the subject of this Report, is situated in the south central portion of West Virginia. Roughly it is a diamond-shaped area, the two long axes being almost directly north and south and east and west in direction, the former or shorter axis being 33 miles long and the latter or longer of the two being 43.275 miles. In geographical position the county lies between the parallels of $38^{\circ} 4' 45''$ and $38^{\circ} 33' 27''$, North Latitude, and the meridians of $80^{\circ} 26' 12''$ and $81^{\circ} 14' 4''$, West Longitude from Greenwich. It is bounded on the north by Clay, Braxton and Webster; on the east by Webster and Greenbrier; on the south by Greenbrier and Fayette; and on the west by Fayette and Clay Counties. Its area is mainly included within the drainage basin of Gauley River, but a small portion along the northern and northwestern boundary drains into Elk River, both of these rivers being tributary to the Great Kanawha, which in turn flows into the Ohio River.

The geographical position of the county may be observed on Figures 1 and 2 in this Volume and on Maps I and II, enclosed in a separate atlas accompanying this Report.

TRANSPORTATION.

Water Ways.

Although drained mainly by the Gauley River, a water-course of large volume flowing entirely across the central portion in a westerly direction, Nicholas County has no water transportation, as the extremely swift current and rock-strewn river-bed preclude any attempt at navigation with boats. Before the advent of railroad transportation logs were sometimes floated down it at times of flood but only at great personal hazard to those engaged and often with the loss of much valuable timber. Various tributaries of the Gauley and Elk Rivers have been used for the transportation of logs to local mills, splash-dams having been extensively employed to increase the volume of water when necessary. No attempt has ever been made to build locks and dams on the Gauley, and owing to the great number required on account of the swift current no artificial system of navigation would be justified.

Steam Railroads.

Baltimore and Ohio Railroad.—The Richwood Branch of the Baltimore and Ohio Railroad, which extends in a north and south direction from Clarksburg to Richwood, a distance of 121 miles, passes almost across the eastern corner of Nicholas County, entering at Allingdale on the Gauley River, and terminating at the important lumber center of Richwood, the distance between the two points being 17.6 miles. As previously described by the writer¹, this branch of the Baltimore and Ohio was mainly built by Hon. J. N. Camden, its name being the West Virginia and Pittsburgh when first completed to Camden-on-Gauley, but it was sold to the Baltimore and Ohio Company in September, 1899. It was completed from Weston to Flatwoods in 1890 and 1891, to Camden-on-Gauley in 1891 and 1892, and to Richwood in 1899. It is a standard gauge road doing a general freight and pas-

¹Lewis and Gilmer Report, W. Va. Geol. Survey, p. 3; 1916.

senger business, and by its connections with the main line of the parent system at Clarksburg and Grafton affords a convenient outlet to the north, east and west.

Erbacon and Summersville Railroad.—The Erbacon and Summersville Railroad, tributary to the Richwood Branch of the Baltimore and Ohio at Erbacon, Webster County, is a standard gauge line extending westward to Skyles and Birch River, Nicholas County. According to C. O. Thayer, Superintendent of the Davis-Eakin Lumber Company, of Skyles, the road was begun in 1911, there being a total of 15 miles of track, of which approximately 10 miles are in Nicholas, its business being principally that of hauling logs and lumber for the above-named company.

Strouds Creek and Muddlety Railroad.—The Strouds Creek and Muddlety Railroad, tributary to the Richwood Branch of the Baltimore and Ohio at Allingdale, is a standard gauge line extending northwestward up Strouds Creek, being partly in Webster and partly in Nicholas, and across the divide, a distance of 5.7 miles, to Tioga, Nicholas County, where it serves the Birch Valley Lumber Company, there being several branches into the drainage of Beaver and Muddlety Creeks, the total length of track, exclusive of sidings, being 17 miles. The road handles a general freight and passenger business between Allingdale and Tioga.

Pardee and Curtin Lumber Company Railroad.—The Pardee and Curtin Lumber Company Railroad, tributary to the Richwood Branch of the Baltimore and Ohio at Curtin, is a narrow gauge line owned by the Pardee and Curtin Lumber Company and used mainly in transporting logs and lumber for that corporation. From Curtin the line extends down Gauley River, a distance of $5\frac{1}{4}$ miles to the mouth of Panther Creek, where it divides, one branch being built down Gauley $6\frac{3}{4}$ miles, while the main line passes up Panther Creek, and crossing the divide to Hominy Creek, reaches Hominy Mill where it again divides, a branch extending down Hominy Creek. From Hominy Mill the line passes on up Hominy Creek to Hominy Falls where it branches again, one division passing across the divide to the waters of Auglins Creek, while the other extends up Hominy Creek to the mouth

of Prices Fork near the Greenbrier County Line. According to H. B. Curtin, Assistant Treasurer of the company, there is a total of 50 to 60 miles of track, its construction having been begun about the time the mill was established at Curtin in 1900. In addition to the lines above described a short branch extends from Curtin one mile up the west side of Cherry River to Coal Siding where another mill is served.

Cherry River Boom and Lumber Company Railroad.—The Cherry River Boom and Lumber Company Railroad, which serves the great lumber mills of the Cherry River Company at Camden-on-Gauley, Holcomb, and Richwood, is a standard gauge logging road tributary to the Richwood Branch of the Baltimore and Ohio. According to Capt. H. W. Armstrong, General Superintendent of the company, the trackage now totals 40 to 50 miles. Construction was begun in 1899, when the Richwood mill was established. Of the various branches the principal carrier is the line that extends eastward from Richwood, up North Fork of Cherry River, crossing the divide between Cherry and Cranberry Rivers at an elevation of 3633 feet, and descending to Dogway village on Dogway Fork of Cranberry, at the extreme southern end of Webster County this branch having been begun in 1905, completed to Dogway in 1911, and being subsequently extended to the mouth of Dogway Fork and thence up Cranberry into Pocahontas County.

A second branch starts from Richwood, and passing down the south side of Cherry River to Fenwick, divides into two branches, one of which extends up Laurel Creek into Greenbrier County (the southern portion of this track having been lately removed), while the other branch extends down Cherry River toward the Holcomb mill which it is intended to serve.

A third branch starts from the Baltimore and Ohio Railroad at Cranberry Station and extends eastward up Cranberry River, a distance of 19 miles, to a junction with the Dogway Branch described above, having been completed in 1917.

A fourth having been begun in 1917 and being still under construction, starts from the Baltimore and Ohio one-fourth mile south of Allingdale, and extends eastward up the south

side of Gauley River, its ultimate destination being the forests on Williams River above Dyer. Approximately four miles of this branch have been completed. Of the entire Cherry River system approximately 24 miles of track lie within Nicholas County.

Kanawha and Michigan Railway.—The Kanawha and Michigan Railway, extending from Corning, Ohio, to Gauley Bridge, Fayette County, W. Va., via Point Pleasant and Charleston, and the West Virginia portion lying along the north bank of the Great Kanawha River, is by its position and connections an important transportation asset to Nicholas County. In the summer of 1917 an extension of the main line from Gauley Bridge to Belva was begun, which, when completed will bring the terminus to the Nicholas County Line where it connects with the Flynn Lumber Company Railroad, an important subsidiary now owned by the Kanawha and Michigan Company and penetrating several miles into the interior of the county as will be later described. The Kanawha and Michigan Railroad, which is of standard gauge, and fully equipped for general freight and passenger service, was completed to Charleston in 1892 and to Gauley Bridge in 1894.

Flynn Lumber Company Railroad.—The Flynn Lumber Company Railroad, now owned by the Kanawha and Michigan Railway Company, was begun about the time the Flynn Mill was established at Swiss in 1905, and various branches and additions have been made from time to time as the needs of the company have required. This railroad, which is of standard gauge, is now tributary to the Gauley Branch of the Chesapeake and Ohio Railway at Belva, and from that point follows the north bank of Gauley River, eastward to the company mill at Swiss, 4.0 miles, and thence up the same side of the river, 8.3 miles to the mouth of Peters Creek, and thence up Peters Creek, 12.0 miles, to the mouth of Hutchinson Branch, and thence up Hutchinson Branch, 2.2 miles, to its head, the total line of 26.5 miles lying within Nicholas County. As now operated this railroad serves principally the needs of the Flynn Lumber Company, but also handles a limited amount of freight, passenger and express business for the general public, although no regular passenger trains are run.

Chesapeake and Ohio Railway, Gauley Branch.—The Gauley Branch of the Chesapeake and Ohio Railway leaves the main line of the parent system at Gauley Junction, Fayette County, and passing up the south side of Gauley River, 6.6 miles, crosses the latter at Belva, and, entering Nicholas County at that point, extends northward up Twentymile Creek, 1.0 mile, to the mouth of Bells Creek where it divides, one branch extending northward up Bells Creek and Open Fork of the same stream, 3.0 miles, to Bintree where it serves an important mining community. The other branch extends northeastward, 4.7 miles, to Vaughan, and thence northward, 1.4 miles, up Rockcamp Branch to the mines at Greendale. According to Ray V. Hennen² the road was completed in 1893-4 from Gauley Junction to Greendale, and from the mouth of Bells Creek to Bintree (formerly Carterboro) in September, 1904. The Gauley Branch handles a general freight and passenger business.

West Virginia Timber Company Railroad.—The West Virginia Timber Company Railroad, tributary to the Gauley Branch of the Chesapeake and Ohio at Vaughan, is a narrow gauge logging road, extending from Vaughan two or three miles down Twentymile Creek and also from Vaughan eastward up Twentymile Creek with short branches up several of the smaller streams. The road, which was begun about the time the West Virginia Timber Company established its mill at Vaughan in 1904, formerly extended nearly to the head of Twentymile Creek, but a considerable portion of the track has been removed, due to the completion of lumber activities on the upper waters.

Sewell Valley Railroad.—The Sewell Valley Railroad, tributary to the main line of the Chesapeake and Ohio at Meadow Creek, Raleigh County, is a standard gauge line, 40.0 miles long, extending northward through Raleigh and Fayette Counties to Nallen on Meadow River in the latter county, its terminus being at the southwestern corner of Nicholas County. At Nallen the road serves the needs of the Wilderness Lumber Company and from this point a

²Ray V. Hennen, Fayette Report, W. Va. Geol. Survey, p. 11; 1919.

narrow gauge logging branch extends up Miller Creek into Nicholas County.

Highways.

Summersville and Slaven Cabin Road.—The Summersville and Slaven Cabin Road, starting at Summersville, extends eastward via Nile, Beaver, and Craigsville, and, entering Webster County at Allingdale, passes eastward through Camden-on-Gauley, Cowen, Webster Springs, and via the summit of Point Mountain to Monterville and Valley Head, intersecting the Parkersburg and Staunton Turnpike at Huttonsville, Randolph County. The Slaven Cabin of early days, from which the eastern terminus of the road is named, was situated on the eastern slope of Shaver Mountain, a short distance west of the present town of Durbin, Pocahontas County. This road is an unimproved dirt highway and on account of its rough surface and steep grades through a considerable portion of Nicholas County most of the automobile traffic from Summersville detours northward up Muddlety Creek and thence, via McMillion Creek and Little Beaver, returns to the main road at Beaver, from which point it continues eastward to the railroad at Camden-on-Gauley.

Weston and Gauley Bridge Road.—The Weston and Gauley Bridge Road, starting at Weston, Lewis County, extends southward via Sutton, and entering Nicholas County at Birch River village, crosses the high Powell Mountain ridge, and passes southward through the Muddlety Creek Valley via Hookersville and Muddlety to Summersville, where it turns westward, passing down Peters Creek via Enon, Gilboa, Zela, and Drennen, leaving Peters Creek at Lockwood, and thence via Otter Creek and Little Elk, reaches the Gauley River at Swiss, from which point its course is along the north bank of that stream to the county line at Belva, its further course being by the same river to Gauley Bridge, Fayette County, where it intersects the James River and Kanawha Turnpike. It is an unimproved dirt highway, but is passable for automobile traffic in the summer months and is practically the only through automobile road from the northern counties

to Charleston. According to Miletus Simms, of Swiss, a pioneer resident of Nicholas, it was surveyed in 1851, construction was begun the following year, and pushed rapidly to completion.

Nicholas Road.—The Nicholas Road, starting from the James River and Kanawha Turnpike at Little Sewell, Greenbrier County, extends northward through Rupert and reaching Nicholas County at its extreme southern point, at an elevation of 3131 feet above sea-level, traverses the high ridges mainly, passing one-half mile east of Snow Hill, then via Spruce Grove School, McMillion School and Mt. Nebo, crosses the Gauley River at the Hughes Ferry Bridge, and terminates at Summersville. Although an unimproved dirt road it affords an outlet to the southern counties, being passable for automobile traffic during the summer months.

Ordinary Public Roads.—Nicholas County is served mainly by earthen roads of a somewhat inferior character, there being no hard-surfaced highways. Most of these roads have a sandy surface, however, making them fairly free from mud so that automobile traffic can be maintained over most of them during the summer and fall months. The principal automobile route from Summersville to Richwood is via Craigsville and Cranberry Station, but if preferred the traffic may pass via Hominy Falls or Nettie, and thence to Richwood via Fenwick. According to Hon. A. D. Williams³, formerly Chairman of the State Road Bureau, the county has 516 miles of road, this figure being somewhat small as compared to some of the more populous counties of like area.

GENERAL DESCRIPTION.

Miscellaneous Items.

Formation.—Nicholas County was formed from Greenbrier by Act of the Virginia General Assembly, passed January 30, 1818, but as the boundaries established at that time proved unsatisfactory, a subsequent Act, passed on January 28, 1820,

³First Annual Report, State Road Bureau, p. 306; 1914.

revised its limits. By later Acts a considerable portion of its area, as then defined, was taken from it and added to the new counties of Fayette (in 1831), Braxton (in 1836), Clay (in 1858), and Webster (in 1860). The county derives its name from Hon. Wilson Cary Nicholas, a prominent Virginia pioneer who served as commander of Washington's Life Guard, as United States Senator, and as Governor of Virginia.

Area.—The present area of Nicholas by Magisterial Districts, as determined with planimeter by R. C. Tucker from the topographic sheets of the United States Geological Survey, is as follows:

Districts.	Square Miles.
Jefferson	78.54
Grant	48.95
Summersville	64.25
Hamilton	148.94
Beaver	90.77
Richwood	18.38
Kentucky	118.03
Wilderness	88.91
Total for County	656.77

Relief.—The surface of Nicholas varies in elevation from 675 feet above sea-level at Belva, where Twentymile Creek empties into Gauley River at the extreme western end of the county, to 3850 feet on a high knob at the Webster County Line near the extreme eastern end, making a total difference of 3175 feet.

Climate.—The climate of that portion of Nicholas County north of Gauley River differs but little from that found in other central counties of the State, but in the high plateau region south of Gauley the summer is perceptibly shorter and the winters more severe. The following statistics concerning temperature, precipitation and snowfall at Holcomb, W. Va., from 1912 to 1918, furnished by H. C. Howe, Section Director, U. S. Weather Bureau, Parkersburg, W. Va., give the main climatological facts:

U. S. Department of Agriculture, Weather Bureau.
Holcomb, W. Va.

Temperature. Mean Monthly Temperatures.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1912	39.6	31.0	43.4	48.8	58.8	64.7	70.0	66.8	68.0	54.5	40.4	33.6	.....
1913	33.5	29.5	33.9	50.4	60.4	66.4	71.0	69.6	60.9	51.6	40.9	35.4	51.4
1914	30.6	35.4	31.4	53.2	60.6	67.2	69.4	67.8	61.2	55.4	38.9	29.8	50.3
1915	37.1	29.2	35.4	47.6	61.8	63.2	73.4	70.2	61.6	52.6	42.2	31.8	51.1
1916	32.8	28.3	40.9	49.7	53.2	65.1	69.7	69.0	61.0	47.9	38.8	23.5	48.3
1917	19.4	33.3	.....	49.4	63.6	65.0	65.6	72.1	57.6	55.9	40.8	40.0	.....
1918	32.2	31.1	37.0	49.8	59.7	66.0	69.9	69.3	62.4	53.4	40.8	32.3	.....
Averages	32.2	31.1	37.0	49.8	59.7	66.0	69.9	69.3	62.4	53.4	40.8	32.3	50.3

U. S. Department of Agriculture, Weather Bureau.
Holcomb, W. Va.

Precipitation.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1912	.....	.....	.....	4.20	5.17	5.37	7.88	4.39	4.54	2.05	2.78	2.82	.....
1913	6.41	3.46	3.92	4.33	6.36	3.74	8.42	4.87	4.80	6.22	5.42	2.80	60.75
1914	4.38	2.66	4.48	6.66	1.75	1.05	4.45	7.51	2.62	3.51	1.06	5.21	45.34
1915	6.28	3.59	1.93	2.51	4.56	3.55	6.47	5.17	4.35	4.00	3.85	3.45	49.71
1916	5.22	3.51	6.15	3.58	3.75	5.23	3.11	4.73	6.31	2.55	1.84	3.87	49.85
1917	4.92	4.73	8.72	2.62	6.07	4.80	7.86	1.84	2.75	4.68	1.96	1.75	52.70
1918	5.13	3.00	9.37	5.68	4.96	6.39	4.65	5.00	4.10	4.95	2.38	5.34	60.95
Averages	5.39	3.49	5.76	4.23	4.66	4.30	6.12	4.79	4.21	3.99	2.76	3.61	53.22

U. S. Department of Agriculture, Weather Bureau.
Holcomb, W. Va.
Snowfall.

Year	Jan.	Feb.	Mar.	Apr.	Oct.	Nov.	Dec.	Annual.
1912	....	....	....	....	....	5.2	15.5	....
1913	14.0	6.0	8.5	....	T	24.0	6.0	58.5
1914	23.0	15.0	56.5	0.5	T	4.0	12.0	111.0
1915	20.0	15.0	16.5	T	....	6.2	25.0	82.7
1916	16.0	31.0	30.0	8.0	....	1.0	22.0	108.0
1917	8.0	9.0	7.0	6.0	11.0	3.0	15.0	59.0
1918	16.0	5.0	T	10.0	....	T	10.0	41.0

Population.—The following table, taken from the U. S. Census returns for 1910, shows the population of Nicholas for the last three enumerations:

Population of Nicholas County.

Minor Civil Division.	1910	1900	1890
Beaver District, including Richwood town.....	6,356	2,205	1,085
Richwood town	3,061	.....	.....
Grant District.....	1,155	1,116	1,247
Hamilton District.....	2,048	2,106	1,787
Jefferson District.....	2,055	1,235	991
Kentucky District.....	2,820	1,516	1,360
Summersville District, including Summersville town	1,462	1,452	1,274
Summersville town	204	223	.....
Wilderness District.....	1,803	1,773	1,565
Totals for County.....	17,699	11,403	9,309

The returns do not show any figures for the population of Richwood District, which was established from a small portion (18.38 square miles) of Beaver District subsequent to the publication of the 1910 Census. The table also shows a small figure for the population of Richwood town, which has increased greatly since the 1910 Census, an estimate of its present number of inhabitants being given on a subsequent page under the description of the town.

Products.—The principal animal products are horses,

cattle, sheep, hogs, mules, poultry, and bees, their value being in the order named.

The principal agricultural products are corn, hay, potatoes, apples, oats, buckwheat, wheat, peaches, and cherries.

The principal mineral and manufactured products are lumber and wood products (including paper, wood pulp, tanning extract, clothes-pins, baskets, broom handles, chair stocks, and wagon hubs), coal, natural gas, and leather.

Property Valuation.—According to Hon. J. A. Darst, State Auditor, the following table shows the property valuation for Nicholas for the last three years:

	1916	1917	1918
Real Estate.....	\$ 9,001,280	\$ 9,385,145	\$ 9,403,365
Personal Property.....	4,919,675	5,424,190	5,570,729
	<hr/>	<hr/>	<hr/>
	\$13,920,955	\$14,809,335	\$14,974,094

A comparison of the above figures with those for other counties in the Auditor's Report shows that Nicholas ranks 33rd in point of wealth in the State.

Postal Service.—Nicholas County is served partly by the railway mail service and partly by star route carriers, there being no rural free delivery routes. Summersville, which is situated in the interior far from the railroads, is served principally by two daily mails one of which comes from the Baltimore and Ohio Railroad at Camden-on-Gauley, and the other from the Kanawha and Michigan Railway at Gauley Bridge, automobiles being used in summer and hacks in winter. The following table, compiled from information furnished by John L. Evans, Postmaster at Summersville, and corrected for later changes, shows the number of post-offices now in existence in the county:

Nicholas County Post-Offices.

Albion	Bruce	Craigsville
Bamboo	Burl	Curtin
Bays	Calvin	Dade
Beaver	Canvas	Dain
Belva	Carl	Deepwell
Birch River	Coe	Delphi

Nicholas County Post-Offices (Continued).

Dixie	Lockwood	Saxman
Donald	Morris	Snow Hill
Drennen	Mount Lookout	Sparks
Enon	Mount Nebo	Summersville
Fenwick	Muddlety	Swiss
Fowlerknob	Nettie	Tioga
Gad	Nile	Tipton
Gilboa	Nod	Vaughan
Holcomb	Persinger	Vinton
Hominy Falls	Poe	Waggy
Keslers Cross Lanes	Pool	Woodbine
Kirkwood	Richwood	Zela
Leivasy	Runa	

*Towns and Industries.***Summersville.**

Summersville, the county-seat of Nicholas, was established by Act of the General Assembly of Virginia January 19, 1820, and was incorporated as a town under the laws of the same State March 20, 1860, its population for 1910, as recorded by the U. S. Census, being 204. Situated on a high rolling plateau, approximately 1900 feet above sea-level and three hundred feet above the level of Gauley River, having numerous small hillocks, which rise to a height of one hundred feet or more above the general level, most of which being dotted with handsome homes, and flanked on the north and west by a high range of hills through which the waters of Peters Creek have cut their deep channel, the town presents an unusually pleasing appearance to the visitor. Being remote from railroad transportation there are no manufacturing enterprises of more than a purely local character, and the principal business transacted is that which is found in the usual county-seat. The manufacture of brick for local purposes has been carried on for many years, a description of this industry being published on subsequent pages in Chapter XII.

Richwood.

Richwood, the principal town of the county, is located at

the extreme southeastern edge, next to Greenbrier, being situated in a broad valley at the forks of Cherry River, 2200 feet above sea-level. Owing its existence primarily to the wood industry which sprang into life when the Clarksburg and Richwood Branch of the Baltimore and Ohio Railroad was completed in 1889, its growth has been truly phenomenal. Previous to the building of the railroad there was only a small settlement of mountain cabins, surrounded by virgin forests, but in 1910 the town had a population of 3,061 and at the present time it is estimated at 6,000 or more, articles of incorporation having been secured in 1901. As indicated above, the town is served by the Baltimore and Ohio Railroad, being the terminus of an important branch, from which several standard gauge logging roads radiate into the lumber forests.

Cherry River Boom and Lumber Company.—The **Richwood Mill** of the Cherry River Boom and Lumber Company, located in the center of the town, is a large plant devoted to the manufacture of spruce and hemlock lumber, both rough and surfaced. According to Capt. H. W. Armstrong, General Superintendent, the mill was built in 1899, the head office of the company being at Scranton, Pa. The equipment includes a double-band and resaw plant, with a daily capacity of 65,000 to 70,000 feet, the timber coming mainly from the Cranberry River forests of Webster and Pocahontas Counties, and there being approximately 300 men employed in the mill and on the company railroad which serves it.

The **Holcomb Mill** of the same company, located at Holcomb, along the Baltimore and Ohio Railroad, 6 miles north of Richwood, was acquired from Curl & Evans in 1904, its equipment including a single-band saw, and its output of rough hardwood lumber being 35,000 feet daily, 60 men being employed. This mill obtains its timber from the same region mentioned above.

The **Gauley Mill** of the same company, located at Gauley Mills, Webster County, and securing its timber from the same region noted above, has already been described in a previous Report of the Survey.⁴

J. D. Westcott & Sons.—The firm of J. D. Westcott &

⁴D. B. Reger, Webster Report, W. Va. Geol. Survey, pp. 16-17; 1920.

Sons, with headquarters at Union City, Pa., and having a plant located on North Fork of Cherry River at the north-eastern edge of Richwood, the same having been established in 1912, manufactures broom handles and chair stock. According to Ivan Coleson, Superintendent, the plant has a daily capacity of 7,000 chair rounds and 15,000 handles, 10,000 feet of beech and maple being used. Among other special equipment Whitney back-knife and Hawker lathes are in use, 36 men being employed, of whom 5 are skilled laborers, the output of the plant being shipped to the general trade.

H. G. Sherwood Company.—The H. G. Sherwood Company, with headquarters at Richwood, and plant on the South Fork of Cherry River at the southeastern edge of the town, manufactures wagon hubs. According to H. G. Sherwood, owner and manager, the plant has a capacity of 1,000 hubs daily, birch wood being used exclusively and 12 to 15 men being employed, the output going to the general trade.

Fulton Manufacturing Company.—The Fulton Manufacturing Company, with headquarters at Richwood and with a plant located near the center of the town, was first established in 1901 as the Dodge Clothespin Company, the name having been later changed as above, although remaining under the same ownership and management. According to J. B. Dodge, President, the plant manufactures common and spring clothes-pins and wire-end butter dishes, being the largest establishment of its kind in the world. Under normal operation this concern ships 1 car-load of clothes-pins and 400,000 butter dishes daily, beech wood being used for clothes-pins and birch and maple for butter dishes, one-half million feet of wood being used monthly. The factory employs 250 persons, of whom 125 are female, 100 of the women and 65 men being classed as skilled laborers. The Smith clothes-pin machine is used, the output going to both foreign and domestic markets.

Cherry River Extract Company.—The Cherry River Extract Company, with its head office at Richwood, has two closely allied plants located on the south side of Cherry River west of the main portion of the town, one of these being devoted to the manufacture of hemlock bark extract and the

other to the manufacture of chestnut wood extract, both products being employed in tanning leather. According to W. F. Wilson, Manager, the hemlock plant was established in 1913, 90 tons of bark being consumed daily, giving an output of 125 barrels of extract, its equipment including a bark mill, open leaches and evaporators. The chestnut wood plant, in which a large amount of dry chestnut timber unfit for other purposes is used, consumes 125 cords of wood daily, giving an output of 150 barrels of extract, machinery of standard pattern and autoclaves for extracting juice under pressure being in use. The output of these plants is used in the general trade, there being 65 men employed in the works, of whom 50 are classed as skilled laborers, and 65 additional in the camps and wood yards.

William F. Mosser Company.—The William F. Mosser Company, with head office at Boston, Mass., and works at Richwood, located on the south side of Cherry River west of the main portion of the town, operates two immense tanneries each having a capacity for tanning into leather 1200 sides daily, making 2400 in all. According to John Mulrody, General Superintendent, the hides are secured from the general trade, the output mostly going to Boston, there being 400 men employed, of whom 75 are skilled laborers. Standard processes are in use throughout the plants.

Cherry River Paper Company.—The Cherry River Paper Company, established in 1905, with head office at Scranton, Pa., and works at Richwood on the south side of Cherry River, at the extreme western edge of town at the mouth of Little Laurel Creek, manufactures all kinds of wrapping paper. According to C. B. Brooksbank, Superintendent, the company manufactures its own sulphite pulp, from spruce and hemlock logs and mill slabs, its daily capacity being 75 tons of paper, the product going to the general trade, and standard processes being in use throughout the plant. Under normal conditions 400 to 425 men are employed, of whom 200 are skilled laborers.

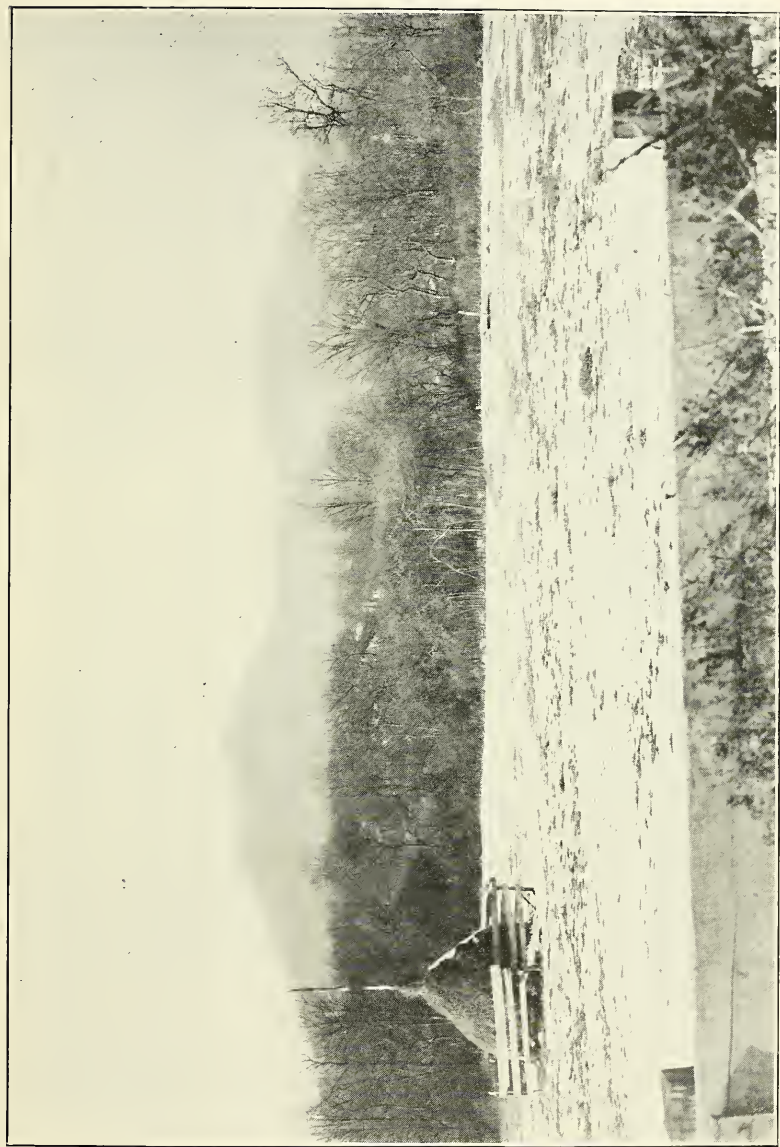


PLATE II.—Looking north from Cottle Glade School on Summersville and Slaven Cabin Road; Cottle Gilbert Sandstone occupy foreground; Cottle Knob is in right background; Topography of Allegheny Series and Kanawha Group.

Photo by E. E. Harris.

• Villages.

Besides the two incorporated towns described above there are numerous lumber, mining, and residential villages scattered throughout the county, of which the following list gives the more important ones, with their populations, as estimated by the Postmaster or some other responsible person in 1917, **mining towns** being printed in black faced type and lumber towns marked with an asterisk (*):

Village	Population 1917	Village	Population 1917
Beaver	35	*Hominy Mill	150
Belva	150	Keslers Cross Lanes	35
Bentree	200	Leivasy	50
*Birch River	75	Lockwood	50
Cambria	100	Mount Lookout	60
Craigsville	125	Persinger	40
Cranberry (Woodbine P. O.)	50	Runa	60
*Curtin	300	Saxman	250
*Dain	200	*Skyles	200
*Dixie	75	Sparks	50
Drennen	20	*Swiss	200
Enon	25	*Tioga	250
*Fenwick	200	Tipton	50
Gilboa	25	*Vaughan	250
Greendale	159	*Waggy	30
*Holcomb	175	Zela	30
Hominy Falls	100		f

CHAPTER II.

PHYSIOGRAPHY.

PHYSIOGRAPHIC CHANGES.

Geographically Nicholas County belongs in the Cumberland Plateau, or Western Division, of the Appalachian Province. Its surface features are a continuation of land forms that occur and have been described in counties lying farther north and west, the mountains and ridges that form the present sky-line being the remains of an extensive peneplain commonly presumed to have been developed in early Cretaceous time when practically the whole surface of the Cumberland Plateau was reduced to an almost level condition. Subsequent elevation of the general surface has raised this old peneplain to a much higher level than it formerly occupied, and consequent stream erosion, much of which was in progress during the epoch of elevation, has cut great valleys through the ancient plain until the sky-line alone, as formed by the ridges, is left as a reminder of this age long past. As the total elevation along the southeastern border of the plateau, next to the Alleghany Front, was much greater than in the region next to the Ohio River, a cross-section of the sky-line shows a gradual northwestward dip.

Certain features yet remain that indicate a still more ancient land surface than that described above. In the region north of Gauley River, Cottle Knob, Powell Mountain, Corren Knob, Panther Mountain, and possibly Lonetree Mountain, are conspicuous monadnocks rising above the general crest of the ridges, while on the south side of Gauley, Mt. Nebo, Fowler Knob, Pine Ridge, Bearhole Ridge, Shawver Ridge, and Coggins Knob, appear to be fragments of a land surface that existed in pre-Cretaceous time.

In the Alleghany Mountain region, farther east, there is a well-marked peneplain that developed subsequent to that of the Cretaceous Period described above. This latter epoch of leveling is supposed to have reached its maximum development in early Tertiary but in Nicholas never reached a mature stage. Its influence can be noted in many of the short tributary ravines that flow into the Gauley River, the drainage basins of these rivulets showing an approach to base-leveled maturity near their heads but plunging abruptly down in the last quarter or half mile of their courses. Some of these steep descents may be accounted for by hard sandstone ledges that hold up the valleys but most of them are evidently due to the Tertiary uplift that revived the parent streams and caused rapid cutting that has not yet reached the heads of the tributaries. This later peneplain seems to be evidenced north of Gauley by the comparatively uniform plateau that extends parallel to the river from the Cottle Glades near Camden-on-Gauley southwestward via Craigsville, Beaver, Nile, and Summersville to Keslers Cross Lanes, in which latter vicinity its influence is pronounced. In this region the ponding effect of the Gilbert, Dotson, and Nuttall Sandstones, which dip in a direction opposite to that of the tributary drainage, is very pronounced, but these sandstones seem to be responsible not for the original plain but only for its preservation. South of Gauley River it appears in two localities, the first being in the vicinity of Canvas, and the second at Mt. Lookout and Runa, where the old plain is distinctly visible.

In referring to the supposed age of the Cretaceous and other peneplains described above the writer has followed the commonly accepted inferences of numerous writers on the physiography of the Appalachian Province. A recent publication by Shaw¹, however, disputes the conclusion that any of these peneplains could have been formed at such an early period and still remain in existence over such wide areas as they are known to cover, the opinion being expressed that none of them is earlier than Tertiary or perhaps mid-Tertiary time. Certain facts presented in the publication

¹E. W. Shaw, Ages of Peneplains of the Appalachian Province; Bull. Geol. Soc. Am., Vol. 29, No. 3; Sept. 1918.

referred to seem to be well founded but unfortunately little evidence is available on the western side of the Appalachian System in West Virginia because of the fact that Cretaceous and Tertiary sediments are entirely lacking along the Appalachian Basin north of the extreme southern portion of Kentucky, leaving no basis, other than mere conjecture, for estimating the supposed rate of degradation.

Evidence of a former base-leveled condition of the major drainage of the county is abundant. The Gauley River shows numerous meanders which must have developed during the time of the Cretaceous Peneplain, and which have been preserved through all the subsequent cutting that has reduced its valley to a much lower level. The same features are visible to a less noticeable extent on Meadow River and Hominy Creek, but are infrequent on Cherry River. At the northern end of the county they are evident to a less degree along Birch River.

The rapid erosion now in progress along the Gauley River and many of its tributary streams and the absence of wide valleys and recent meanders indicate that the present physiographic cycle is an intermediate phase and that well nigh countless years must elapse before the great intervening ridges can be reduced to another peneplain.

There is no evidence to show that the minor folds that cross the western portion of Nicholas have influenced the courses of any important streams, as the Gauley River cuts squarely across both the Clifftop Syncline and the Mann Mountain Anticline, and Little Elk and Twentymile Creeks show the same disregard of the latter fold, the slow nature of the folding, that permitted erosion to continue steadily, being very apparent.

Only a few instances of diverted stream channels and stream capture may be noted. In the eastern end of the county it seems possible that the headwaters of Little Beaver Creek may once have flowed into Muddlety Creek via Harris Fork of the latter stream, as the direction of this portion of Little Beaver is abnormal and there is a very low divide at the head of Harris Fork. It appears probable, also, that Back Fork of McMillion Creek may once have flowed into Persinger

Creek, as the course of this short tributary is clearly opposite to the normal drainage of McMillion Creek, and there is a low divide at the Hickman School through which it may have reached Persinger. In this region, also, the waters of Anthony Creek and Laurel Creek, tributary to Birch River, are rapidly encroaching on the waters of Beaver and Muddlety Creeks, their currents being more swift and the elevations of their valleys much less than those of the latter two streams, but no stream capture having yet taken place.

In the vicinity of Summersville, also, it seems probable that Peters Creek has captured some drainage that once flowed into Muddlety via Arbuckle Branch, as the tributary streams for a distance of one mile northwest of Summersville are abnormal to the course of Peters Creek. In the western end of the county it seems possible that Peters Creek may once have flowed westward past Lockwood and, passing through the present valleys of Otter and Little Elk Creeks between which there is a comparatively low, well-rounded divide, reached the Gauley River at Swiss, eight miles below its present point of junction with Gauley.

DRAINAGE BASINS.

Table of Stream Data.

The following table, prepared by Mr. Tucker, gives a list of the principal streams of Nicholas, their lengths being divided into sections, usually between large tributaries, and the rate of fall and length, both actual stream measurement and air-line distances, being determined. The last column shows the ratio between the total distance (T.D.) and the air-line distance (A.L.D.). Those having the greatest ratio are usually streams that have more nearly reached base-level, the Gauley River, Meadow River and Deer Creek being conspicuous exceptions to this rule on account of their ancient meanders which are still preserved:

Table of Stream Data.

STREAMS.	Total Distance, Miles.	Total Fall, Feet.	Rate of Fall per Mile, Feet.	Air-line Dis- tance, Feet.	Ratio T. D. to A. L. D.
Gauley River (portion in Nicholas County)	62.7	1347	21.5	33.2	1.89
Allingdale to Cranberry (mouth of Cranberry River)	6.7	85	12.7	4.1	1.63
Cranberry to mouth of Cherry River	1.8	27	15.0	1.5	1.20
Cherry River to Persinger Ford..	11.7	255	21.8	7.0	1.67
Persinger Ford to Brocks Bridge.	4.3	85	19.8	3.6	1.19
Brocks Bridge to Hughes Ferry Bridge	4.2	65	15.5	2.8	1.50
Hughes Ferry Bridge to mouth Mc- Kee Creek	4.2	110	26.2	2.0	2.10
McKee Creek to Carnifex Ferry...	6.5	213	32.8	4.1	1.59
Carnifex Ferry to Lucas.....	6.1	182	30.0	3.9	1.56
Lucas to Belva.....	17.2	325	18.8	9.8	1.75
Twenty-mile Creek (entire).....	26.8	1450	54.1	20.2	1.33
Source to Deal Fork.....	3.5	375	107.1	3.3	1.06
Deal Fork to Harriet.....	6.0	590	98.3	4.2	1.43
Harriet to Vaughan	11.4	349	30.6	9.3	1.22
Vaughan to Belva	5.9	136	23.0	4.4	1.34
Bells Creek (portion in Nicho- las County)	4.4	128	29.1	3.2	1.38
Open Fork (portion in Nicho- las County)	2.5	170	68.0	2.3	1.09.
Rockcamp Fork, source to Green- dale	2.4	394	164.2	2.3	1.04
Greendale to mouth.....	1.5	146	97.3	1.3	1.15
Ash Fork, source to mouth.....	2.8	729	260.4	2.3	1.22
Robinson Fork, source to mouth	3.5	690	197.1	2.9	1.21
Rader Fork	2.5	615	246.0	2.3	1.09
Little Elk Creek, source to Upper Elk Hollow	2.3	563	244.8	2.0	1.15
Upper Elk Hollow to mouth (Swiss)	2.6	342	131.5	2.2	1.18
Laurel Creek, source to mouth.....	3.3	1040	315.1	3.0	1.10
Peters Creek, (entire).....	17.6	1000	56.8	11.6	1.52
Source (Summersville) to Pine Run	3.0	375	125.0	2.7	1.11
Pine Run to Zela	4.6	258	56.1	3.7	1.24
Zela to Lockwood	7.0	222	31.7	5.7	1.23
Lockwood to mouth	3.0	145	48.3	2.2	1.36
Buck Garden Creek, source to mouth	5.2	850	163.4	4.4	1.18
Laurel Creek, source to mouth....	4.1	425	103.7	3.8	1.08
Meadow Creek, source to Keslers Crosslanes	2.8	200	71.4	2.2	1.27
Keslers Crosslanes to mouth.....	3.0	440	146.7	2.5	1.20

STREAMS	Total Distance, Miles.	Total Fall, Feet.	Rate of Fall per Mile, Feet	Air-line Dis- tance, Feet.	Ratio T. D. to A. L. D.
Meadow River, Greenbrier County					
Line to Shawver Bridge.....	7.6	335	44.1	4.7	1.62
Shawver Bridge to (mouth) Carni- fex Ferry	3.8	348	91.6	2.8	1.36
Anglins Creek to Elevenmile Fork	6.4	775	121.1	5.1	1.25
Elevenmile Fork to mouth.....	5.2	210	40.8	4.5	1.15
Collision Creek, source to mouth....	5.9	900	152.5	4.8	1.23
McKee Creek, source to mouth.....	3.9	350	89.7	3.6	1.08
Hominy Creek, Greenbrier County					
Line to Hominy Mill.....	7.6	420	55.3	5.3	1.43
Hominy Mill to mouth.....	11.2	565	50.4	8.2	1.37
Deer Creek, source to mouth.....	11.4	745	65.3	5.5	2.07
Jims Creek, source to mouth....	5.1	850	166.7	4.5	1.13
Grassy Creek, source to mouth...	6.2	1010	162.9	5.4	1.15
Brushy Meadow Creek, Green- brier County Line to mouth	5.7	710	124.6	4.2	1.36
Line Laurel Creek, source to mouth	4.1	660	161.0	3.9	1.05
Muddlety Creek, source to mouth....	19.8	830	41.4	12.6	1.57
Source to Clear Fork.....	4.2	394	93.8	3.5	1.20
Clear Fork to Hookersville	5.2	156	30.0	4.7	1.11
Hookersville to mouth.....	10.4	280	26.9	7.8	1.33
Glade Creek, source to mouth.....	5.2	350	67.3	4.8	1.08
McMillion Creek, source to mouth.	6.4	410	64.1	5.4	1.18
Brushy Fork, source to mouth....	5.3	450	84.9	4.9	1.08
Persinger Creek :.....	4.7	655	139.3	2.8	1.68
Beaver Creek, Webster County Line					
to mouth.....	13.2	565	42.2	10.0	1.43
Webster County Line to Delphi...	4.2	45	10.7	3.6	1.17
Delphi to Beaver	4.9	100	20.4	4.2	1.17
Beaver to mouth	4.1	420	102.4	3.1	1.32
Little Beaver Creek, source to Calvin	1.8	275	152.8	1.7	1.06
Calvin to mouth.....	3.7	45	12.2	2.1	1.76
Little Laurel Creek, source to mouth	3.3	900	272.7	3.2	1.03
Panther Creek, source to Lowland..	6.4	810	126.6	5.5	1.16
Lowland to mouth.....	3.2	370	115.6	2.7	1.18
Jims Branch, source to mouth....	4.5	530	117.8	2.5	1.80
Taylor Run, source to mouth.....	5.4	980	181.5	4.7	1.15
Cherry River, Richwood to Fenwick.	4.2	124	29.5	3.4	1.24
Fenwick to Holcomb.....	2.4	70	29.2	2.2	1.09
Holcomb to mouth.....	4.0	90	22.5	3.1	1.29
Morris Creek, source to mouth....	3.8	900	236.8	3.6	1.06
Laurel Creek, Greenbrier County					
Line to mouth	5.8	625	107.7	4.4	1.32

STREAMS	Total Distance, Miles.	Total Fall, Feet.	Rate of Fall per Mile, Feet	Air-line Dis- tance, Feet.	Ratio T. D. to A. L. D.
Little Laurel Creek, Greenbrier County Line to mouth.....	2.8	275	98.2	2.4	1.17
South Fork, Greenbrier County Line to mouth.....	5.4	431	79.6	3.3	1.64
North Fork, Greenbrier County Line to mouth.....	5.4	431	79.6	3.3	1.64
Cranberry River, Webster County Line to mouth.....	7.1	273	38.4	5.4	1.32
Barrenshe Run, source to mouth..	4.6	1385	301.1	4.0	1.15
Rockcamp Run, source to mouth..	3.6	353	98.1	3.0	1.20
Leatherwood Creek, source to Clay County Line	2.1	305	145.2	1.9	1.11
Buffalo Creek, source to Clay County Line	4.6	1035	225.0	3.4	1.35
Lilly Fork, source to Clay County Line	2.8	510	182.1	2.4	1.17
Beech Fork.....	4.5	780	151.1	4.0	1.12
Robinson Fork, source to Clay County Line	6.4	910	142.2	3.4	1.88
Taylor Creek, source to Clay County Line	4.0	1015	253.7	3.7	1.08
Strange Creek, source to Braxton County Line	7.7	970	126.0	5.7	1.35
Birch River, Webster County Line to Birch River.....	4.8	175	34.4	4.1	1.17
Birch River to Braxton County Line Mill Creek, (south) source to mouth	6.1	110	18.0	4.3	1.42
Mill Creek, (north) source to mouth	3.5	870	248.6	3.0	1.17
Mill Creek, (north) source to mouth	4.4	700	159.1	3.6	1.22
Sewell Creek, source to mouth....	5.3	1000	188.7	4.6	1.15
Tug Fork, source to mouth.....	3.8	675	177.6	3.4	1.12
Anthony Creek, source to mouth....	5.8	920	158.6	5.0	1.16
Poplar Creek, source to mouth....	6.5	1175	180.8	5.3	1.23

Areas of Drainage Basins.

The following table, prepared by Mr. Tucker, gives a planimetric determination of the areas of the principal drainage basins of Nicholas County, the joint topographic sheets of the United States and West Virginia Geological Surveys being used for authority:

Area of Drainage Basins.

Streams	Square Miles
Gauley River, entire.....	1350.00
Gauley River above but not including Twentymile Creek.....	1245.68
Gauley River above but not including Meadow River.....	745.95
Gauley River above but not including Cherry River.....	325.51
Gauley River above but not including Cranberry River.....	187.19
Twentymile Creek, entire.....	105.25
Bells Creek, entire.....	21.71
Open Fork.....	4.66
Rockcamp Fork.....	2.98
Ash Fork.....	2.63
Robinson Fork.....	4.77
Rader Fork.....	3.22
Little Elk Creek.....	4.86
Laurel Creek.....	4.35
Peters Creek, entire.....	52.24
Laurel Creek.....	5.48
Buck Garden Creek.....	7.31
Meadow Creek.....	7.73
Meadow River, entire.....	45.51
Anglins Creek.....	28.77
Collison Creek.....	9.66
McKee Creek.....	5.44
Hominy Creek, entire.....	104.81
Deer Creek, entire.....	27.50
Jims Creek.....	7.51
Grassy Creek, entire.....	19.23
Brushy Meadow Creek.....	7.75
Line Laurel Creek.....	3.99
Muddlety Creek, entire.....	66.57
Glade Creek.....	7.54
McMillion Creek.....	7.49
Brushy Fork.....	8.00
Clear Fork.....	5.54
Persinger Creek.....	3.84
Crooked Run.....	1.55
Beaver Creek, entire.....	39.02
Little Beaver Creek.....	5.74
Little Laurel Creek.....	4.52
Panther Creek, entire.....	16.88
Jims Branch.....	4.12
Taylor Run.....	4.15
Cherry River, entire.....	171.90
Morris Creek.....	6.72
Laurel Creek.....	42.02
Little Laurel Creek.....	16.20
South Fork.....	55.65
North Fork.....	36.39
Cranberry River, entire.....	74.08
Jakeman Run.....	2.78
Barrenshe Run.....	5.84
Rockcamp Run.....	5.53

Streams	Square Miles
Strouds Creek	1.87
Elk River tributaries.....	108.33
Sycamore Creek, above but not including Payne Branch.....	1.61
Leatherwood Creek, above and including Road Fork.....	3.65
Buffalo Creek, above but not including Brushy Fence Fork..	38.29
Lilly Fork, above and including Beech Fork.....	10.43
Robinson Fork, above and including Elm Creek.....	13.30
Taylor Creek, entire.....	7.62
Strange Creek, above but not including Right Fork.....	12.97
Birch River, above but not including Little Birch River.....	51.81
Mill Creek, south side.....	3.09
Mill Creek, north side.....	5.87
Powell Creek.....	9.58
Anthony Creek.....	8.91
Poplar Creek.....	7.51

Description of Drainage Basins.

Gauley River.

Gauley River which, with its tributaries, drains 82 per cent. of Nicholas County, rises against the Gauley Mountain in western Pocahontas at the high elevation of 4600 feet, flows generally southwestward across Webster and Nicholas, finally uniting with the New River at Gauley Bridge, Fayette County, to form the Great Kanawha. At Allingdale, where it crosses the Webster-Nicholas Line, its elevation is 1990 feet; at Belva, where it leaves Nicholas and enters Fayette, it is 675; and at Gauley Bridge it is 640, making a total drop of nearly 4000 feet. Its entire length from head to mouth is 104 miles and that portion in Nicholas County is 62.7 miles. The area of its entire drainage basin is 1350 square miles, and that portion lying within Nicholas County is 548.44 square miles. The area of that portion above but not including Cranberry River is 187.19 square miles, and of that portion above but not including Cherry River 325.51 square miles, and of that portion above but not including Meadow River 745.95 square miles, and of that portion above but not including Twentymile Creek 1245.68 square miles. The total area of Gauley is out of all proportion to its length due to the fact that several large tributary rivers, which drain an immense fan-shaped basin, converge to form it. Throughout most of

its course it is extremely rough and tumultuous, having long rapids and occasional low cataracts, its channel being filled with thousands of large boulders from the great sandstone cliffs that line a considerable portion of its steep and narrow valley. There are numerous wide meanders formed during the time of the supposed Cretaceous Peneplain, as the present cycle is that of a young stream with no wide bottoms nor recent meanders. That portion of its basin lying in Webster County is almost entirely virgin or cut-over woodland but in Nicholas there is a considerable proportion of cleared land within its watershed. Its principal tributaries in Nicholas, in ascending order are Twentymile Creek, Little Elk Creek, Laurel Creek, Peters Creek, Meadow Creek, Meadow River, Collison Creek, McKee Creek, Hominy Creek, Muddlety Creek, Persinger Creek, Crooked Run, Beaver Creek, Little Laurel Creek, Panther Creek, Taylor Run, Cherry River, Cranberry River, Rockcamp Run, and Strouds Creek.

From July 3, 1908, to September 30, 1916, the U. S. Geological Survey and the West Virginia Geological Survey in conjunction have kept three gaging stations, one being located at Belva near the Fayette-Nicholas Line, one near Summersville, and one at Allingdale, near the line between Nicholas and Webster, the records of which are published below, as taken from Water-Supply Papers Nos. 243, 263, 283, 303, 323, 353, 383, 403, and 433 of the former organization:

"Gauley River at Allingdale, W. Va.

"This station, which is located at the Baltimore and Ohio Railroad bridge about one-fourth mile south of the depot at Allingdale, W. Va., was established July 3, 1908, to obtain data for use in studying water supply, water power, flood control, and storage problems.

"Rock Creek enters immediately above the station. The drainage area above the section is about 248 square miles.

"The section at this station is located at a bridge on a curve. The bottom of the stream is rough, but with care accurate measurements can be obtained. Sufficient data have not been obtained to enable estimates of the flow to be made.

"The datum of the gage has remained unchanged. The records are reliable and accurate."

Discharge measurements of Gauley River at
Allingdale, W. Va., in 1908.

Date	Hydrographer.	Width Feet	Area of section Sq. Ft.	Gage height Feet	Dis- charge Sec. Ft.
July 4.....	O'Neill and Chapman	168	763	6.20	698
July 31.....	W. G. Hoyt.....	150	663	5.62	478
Do. ^a	W. G. Hoyt.....	...	...	5.62	458
September 26 ^b ...	W. M. O'Neill.....	34	23	4.07	6

^aMeasured at wooden bridge.

^bWading measurement.

Daily gage height, in feet, of Gauley River at
Allingdale, W. Va., for 1908.

(Observers, H. N. Wood and J. L. Cogar).

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Day	July	Aug.	Sept.	Oct.	Nov.	Dec.
1...	.....	5.42	4.70	4.10	5.05	4.71	16..	5.24	4.91	4.11	4.31	4.40	5.50
2...	.....	5.16	4.61	4.31	4.88	4.85	17..	5.19	4.85	4.10	4.32	4.40	5.08
3...	4.98	5.11	4.56	4.20	4.76	4.80	18..	5.14	4.80	4.07	4.38	4.48	5.89
4...	5.85	4.94	4.47	4.16	4.62	4.65	19..	5.10	4.85	4.02	4.44	4.56	6.95
5...	6.97	5.03	4.49	4.10	4.59	4.50	20..	5.20	4.74	4.00	4.42	4.55	5.96
6...	6.59	5.60	4.51	4.14	4.54	4.52	21..	5.05	4.63	3.99	4.47	4.80	5.60
7...	6.34	5.81	4.49	4.08	4.44	4.85	22..	5.62	4.69	4.04	4.48	4.90	5.45
8...	5.70	5.43	4.43	4.07	4.42	5.69	23..	5.50	4.78	4.00	4.51	4.80	5.34
9...	5.39	5.81	4.41	4.00	4.40	5.15	24..	6.72	4.81	3.98	4.54	4.75	5.16
10...	5.16	5.99	4.40	4.20	4.40	4.98	25..	5.95	4.82	3.97	4.70	4.70	5.22
11...	5.89	5.58	4.38	4.21	4.44	5.72	26..	6.11	5.42	4.00	4.93	4.65	5.65
12...	4.86	5.36	4.29	4.20	4.45	5.75	27..	7.56	5.56	4.02	4.95	4.56	5.56
13...	4.91	5.26	4.26	4.20	4.44	5.98	28..	8.01	5.20	4.04	4.89	4.65	5.25
14...	4.96	5.11	4.20	4.26	4.43	5.33	29..	6.58	5.07	4.08	4.79	4.64	5.30
15...	5.24	5.10	4.14	4.30	4.42	5.25	30..	5.94	4.83	4.10	4.89	4.65	5.30
							31..	3.58	4.75	.....	5.10	.....	6.40

Discharge measurements of Gauley River at
Allingdale, W. Va., for 1909.

Date	Hydrographer	Width Feet	Area of section Sq. Ft.	Gage height Feet	Dis- charge Sec. Ft.
March 27.....	H. J. Jackson.....	169	914	6.75	1,220
November 12....	A. H. Horton.....	166	728	5.96	663

Daily gage height, in feet, of Gauley River at
Allingdale, W. Va., for 1909.

(J. L. Cogar, observer).

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	6.19	5.25	5.98	6.05	7.20	4.99	5.96	4.95	4.12	4.56	5.11	5.05
2.....	5.85	5.35	5.90	6.10	7.10	4.93	5.47	4.79	4.07	4.50	5.07	5.05
3.....	5.65	5.33	5.85	6.11	6.63	5.05	5.28	4.76	4.07	4.47	5.08	5.04
4.....	5.47	5.34	6.40	6.23	6.44	5.01	5.03	4.59	4.06	4.41	5.11	5.05
5.....	5.51	5.49	6.18	6.49	6.20	5.47	5.00	4.49	4.24	4.36	5.01	5.03
6.....	6.99	6.10	6.10	7.20	5.98	5.37	4.96	4.44	4.31	4.35	4.97	5.00
7.....	6.61	6.42	6.11	6.89	5.75	5.38	5.47	4.37	4.52	4.28	4.96	4.96
8.....	6.05	6.08	7.32	6.34	7.03	5.43	5.18	4.33	4.37	4.26	4.96	5.05
9.....	5.82	5.93	6.79	6.01	6.18	5.56	5.00	4.44	4.28	4.21	5.71	5.15
10.....	5.63	7.14	8.62	5.88	6.15	5.59	4.83	4.37	4.36	4.18	7.07	5.05
11.....	5.56	7.18	7.58	5.53	7.20	5.88	4.78	4.32	4.92	4.28	6.55	4.90
12.....	5.60	6.44	6.70	5.32	6.55	5.68	4.68	4.28	4.90	6.61	6.06	5.10
13.....	5.63	6.27	6.35	5.50	6.20	5.65	4.78	4.25	4.62	5.28	5.75	5.15
14.....	5.45	6.92	6.80	10.72	5.90	5.39	5.05	4.17	4.48	6.31	5.30	7.55
15.....	8.60	7.14	6.55	7.92	5.70	5.40	5.25	4.42	4.39	5.17	5.36	6.40
16.....	7.90	8.47	6.26	6.87	5.50	6.46	5.04	5.59	7.77	5.16	5.30	5.95
17.....	7.36	7.56	6.10	6.38	5.51	5.83	4.90	5.21	5.92	5.08	5.26	5.85
18.....	6.64	6.90	5.80	6.05	5.50	5.99	4.85	5.07	5.26	5.01	5.20	6.20
19.....	6.22	6.45	5.73	5.85	5.20	5.88	4.73	4.87	5.01	5.08	5.00	5.20
20.....	6.08	7.29	5.63	5.81	5.12	5.58	4.74	4.72	4.86	5.45	4.90	4.98
21.....	5.96	6.80	5.65	6.75	5.10	5.38	4.68	4.59	4.66	5.25	4.85	4.92
22.....	5.90	7.35	6.69	7.94	5.97	5.23	4.53	4.48	4.64	5.21	4.80	4.90
23.....	5.91	6.90	6.26	7.70	5.45	5.14	4.77	4.46	4.56	5.16	5.05	5.01
24.....	6.11	6.65	6.24	7.75	5.27	5.15	4.82	4.37	5.51	6.61	5.49	4.95
25.....	5.95	7.27	6.28	6.85	5.12	5.88	5.07	4.32	5.44	6.11	5.35	4.90
26.....	5.80	6.65	7.12	6.47	5.15	5.07	4.89	4.27	5.48	5.87	5.25	4.80
27.....	5.62	6.45	6.94	6.25	5.47	5.04	4.69	4.25	4.94	5.72	5.15	4.84
28.....	5.58	6.44	7.36	7.01	5.50	5.00	4.65	4.22	4.81	5.56	5.13	4.86
29.....	5.50	.....	7.05	6.69	5.48	5.03	4.67	4.19	4.71	5.41	5.17	4.80
30.....	5.49	.....	6.61	6.40	5.28	5.15	4.69	4.17	4.68	5.31	5.15	4.82
31.....	5.48	.....	6.26	.....	5.08	.....	4.62	4.09	.....	5.26	.....	4.80

Discharge measurements of Gauley River at
Allingdale, W. Va., in 1910.

Date	Hydrographer	Width Feet	Area of section Sq. Ft.	Gage height Feet	Dis- charge Sec. Ft.
March 12.....	A. H. Horton.....	156	506	5.48	^a 371
March 12.....	A. H. Horton.....	154	694	5.47	406
August 15.....	Bailey and Dort.....	109	109	4.43	^b 77.4

^aAbove regular section.

^bMeasurement not at regular section.

Daily gage height, in feet, of Gauley River at
Allingdale, W. Va., in 1910.

(J. L. Cogar, observer)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	4.85	5.50	8.95	5.03	5.52	5.45	5.20	4.65	4.64	5.20	5.03	5.70
2.....	5.96	5.80	7.58	5.00	5.41	6.30	5.05	4.62	4.40	5.10	5.07	5.61
3.....	8.85	5.50	7.12	4.90	5.30	5.96	4.94	4.50	4.97	5.02	5.10	5.45
4.....	8.55	5.80	6.68	5.03	5.30	5.94	4.92	4.55	5.15	4.95	5.25	5.43
5.....	6.99	5.80	6.32	5.55	5.25	5.90	6.49	4.70	5.36	4.80	5.20	5.45
6.....	6.48	5.68	6.23	5.35	5.15	8.70	6.41	4.65	6.17	4.73	5.12	5.60
7.....	10.45	5.60	6.25	5.36	5.11	7.18	5.60	4.50	5.37	4.70	5.05	5.52
8.....	7.33	5.25	6.00	5.30	5.09	6.40	6.80	4.45	5.20	4.75	5.00	5.48
9.....	7.10	5.35	5.73	5.23	5.61	6.20	6.00	4.41	5.12	5.40	4.90	5.55
10.....	6.11	5.62	5.62	5.20	5.80	6.60	5.65	4.40	5.10	5.33	4.89	5.22
11.....	6.20	5.65	5.50	5.18	5.65	7.10	5.30	4.39	4.92	5.10	4.90	5.20
12.....	5.80	5.52	5.49	5.15	8.35	7.25	5.20	4.40	4.85	4.95	4.88	5.22
13.....	5.61	5.20	5.34	6.00	7.50	7.35	6.75	4.41	4.74	4.85	4.85	5.10
14.....	5.90	5.30	5.32	5.90	6.60	7.15	6.65	4.38	6.60	4.75	4.75	4.85
15.....	6.05	5.32	5.32	5.61	6.00	7.05	6.25	4.45	5.75	4.72	4.71	4.93
16.....	5.50	5.50	5.35	5.52	5.94	11.32	6.10	4.32	5.71	4.67	4.85	5.05
17.....	5.65	7.68	5.40	5.60	5.55	9.50	5.85	4.34	5.18	4.65	4.77	4.95
18.....	5.61	8.50	5.25	5.65	5.60	8.10	5.90	4.31	5.04	4.62	4.74	5.11
19.....	8.85	7.12	5.20	5.69	5.80	7.49	5.72	4.29	4.90	4.59	4.70	5.17
20.....	7.10	6.58	5.20	6.00	5.70	6.98	5.45	4.31	4.86	4.53	4.61	5.72
21.....	6.60	6.24	5.21	6.49	5.65	6.35	5.29	4.10	4.89	4.50	4.50	5.64
22.....	7.35	6.82	5.36	6.60	5.62	6.10	5.11	4.20	4.70	4.64	4.70	5.30
23.....	6.59	6.56	5.34	7.00	5.70	5.80	5.00	4.75	4.69	4.73	4.68	5.35
24.....	6.20	6.50	5.30	7.20	5.52	5.70	5.02	4.70	4.61	4.95	4.70	6.10
25.....	5.85	6.05	5.30	7.01	5.60	5.50	4.88	4.50	5.44	4.90	4.85	6.05
26.....	5.65	5.90	5.28	6.55	5.70	5.36	4.86	4.41	7.78	4.71	5.50	5.70
27.....	5.98	5.75	5.20	6.20	5.65	5.25	5.10	4.35	5.75	4.70	5.47	5.58
28.....	6.10	6.26	5.18	6.00	5.45	5.20	4.90	4.32	6.05	4.90	5.40	5.40
29.....	5.90	.....	5.10	5.81	5.42	5.60	4.80	4.30	5.70	5.30	6.85	5.95
30.....	5.70	.....	5.05	5.70	5.40	5.40	4.72	4.22	5.36	5.15	5.85	10.14
31.....	5.60	.....	5.04	.....	5.48	.....	4.70	4.21	.....	5.05	.....	7.95

"NOTE—No ice reported by observer; relation of gage height to discharge probably not affected by ice."

Discharge measurements of Gauley River at
Allingdale, W. Va., in 1911.

Date	Hydrographer	Gage height Feet	Dis- charge Sec. Ft.
October 24.....	Bailey & Perwien.....	5.82	599
October 24.....	Bailey & Perwien.....	5.80	*586
October 27.....	Bailey & Perwien.....	5.40	380

*Measurement made at wooden bridge above regular section.

Daily gage height, in feet, of Gauley River at
Allingdale, W. Va., for 1911.

(J. L. Cogar, observer).

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	7.43	7.64	5.71	5.78	5.93	4.63	5.41	4.05	5.28	4.39	5.02	5.65
2.....	9.34	7.45	5.63	5.84	6.23	4.65	5.04	4.05	5.18	4.44	4.98	5.54
3.....	9.61	7.00	5.43	5.88	5.98	4.63	4.61	4.07	4.28	4.51	4.92	5.45
4.....	8.13	6.85	5.51	6.75	5.93	4.61	4.53	4.06	4.26	5.13	4.90	5.46
5.....	6.93	6.23	5.57	6.90	5.74	4.60	4.52	4.03	4.26	5.08	4.85	5.50
6.....	6.61	6.08	6.38	8.40	5.68	4.60	4.50	4.03	4.23	5.03	4.90	5.52
7.....	6.28	5.99	8.01	7.13	5.44	4.58	6.33	4.07	4.21	5.58	7.69	5.49
8.....	6.18	5.93	6.98	6.73	5.25	4.51	5.98	5.13	4.24	9.18	6.60	5.46
9.....	5.75	6.13	6.59	6.33	5.12	4.45	5.28	4.83	6.55	8.43	6.35	5.38
10.....	5.48	5.95	6.44	6.01	5.11	4.40	5.13	4.51	5.33	8.05	6.21	5.35
11.....	5.53	5.83	6.72	5.93	5.08	4.38	5.41	4.43	5.13	7.83	5.94	5.34
12.....	5.59	5.75	6.75	5.90	5.03	4.93	5.43	4.34	5.11	7.33	5.53	5.34
13.....	10.58	5.70	6.83	6.23	5.02	5.11	5.28	4.28	5.13	6.45	5.51	5.35
14.....	9.38	5.63	6.98	6.84	4.93	5.12	4.88	4.24	5.17	6.28	5.43	5.30
15.....	9.05	5.53	6.65	7.73	4.85	5.55	4.73	4.21	5.18	6.83	5.33	5.32
16.....	8.40	5.45	6.23	6.24	4.48	4.58	4.63	4.45	7.65	6.68	5.41	5.40
17.....	7.18	5.23	6.15	5.28	4.35	4.53	4.53	4.48	6.78	7.28	5.50	6.10
18.....	6.53	5.18	6.08	5.24	4.28	4.59	4.44	4.43	6.28	9.18	5.82	6.04
19.....	6.13	5.29	6.59	6.05	4.28	4.63	4.43	4.34	6.18	7.58	6.79	6.00
20.....	5.90	5.53	8.32	6.93	4.30	4.59	4.43	4.18	5.53	7.08	6.32	5.90
21.....	5.83	5.42	7.39	7.13	4.43	4.47	4.41	4.18	5.23	6.13	5.89	5.91
22.....	7.48	5.39	6.33	6.93	4.53	4.40	4.43	4.16	5.08	6.08	5.81	6.02
23.....	7.18	5.42	6.38	6.89	4.58	4.38	4.43	4.14	5.04	6.04	5.65	6.01
24.....	6.43	5.63	6.33	6.88	4.58	4.35	4.42	4.13	5.01	5.93	5.58	6.12
25.....	6.25	5.53	6.25	6.35	4.56	4.48	4.40	4.11	4.28	5.81	5.53	6.45
26.....	6.63	5.52	6.13	6.18	4.54	5.08	4.35	4.09	4.24	5.82	5.56	6.55
27.....	7.62	5.51	5.98	5.98	4.53	5.28	4.33	4.07	4.23	5.80	5.79	6.80
28.....	8.23	5.73	5.92	5.62	4.53	5.53	4.31	4.07	4.22	5.31	5.71	6.69
29.....	9.18	.....	5.92	5.59	4.50	5.41	4.30	4.13	4.28	5.19	5.70	6.63
30.....	16.08	.....	5.94	5.73	4.48	5.28	4.18	5.23	4.34	5.15	5.68	5.95
31.....	8.44	.....	6.05	.....	4.47	.....	4.08	6.08	.....	5.09	.....	6.80

“NOTE.—Observer made no report concerning ice. Relation of gage height to discharge probably not affected by ice during 1911.

“Discharge measurement of Gauley River at Allingdale, W. Va., in 1912, was made by C. T. Bailey:

“March 21, 1912: Gage height, 7.65 feet; discharge, 2,060 second-feet.”

Daily gage height, in feet, of Gauley River at
Allingdale, W. Va., for 1912.

(Harry Jones, observer).

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	7.2	7.6	6.25	6.7	5.9	4.71	5.25	7.2	5.15	5.15	5.0	4.80
2.....	6.65	7.2	5.95	6.6	5.85	4.65	5.15	6.2	5.0	5.05	5.15	4.89
3.....	6.6	7.0	5.90	7.6	5.80	4.54	5.15	5.75	4.98	5.0	5.15	5.2
4.....	6.15	7.0	5.6	7.0	5.6	4.78	5.45	5.5	4.96	4.90	5.05	5.5
5.....	5.6	6.7	5.45	6.6	5.5	4.77	6.4	5.3	6.1	4.84	5.0	5.9
6.....	5.2	6.65	5.35	6.25	5.45	4.57	6.05	5.15	4.90	4.78	4.98	6.4
7.....	5.2	6.4	5.25	6.05	5.6	4.57	5.6	5.0	4.94	4.75	5.05	6.5
8.....	5.3	5.8	5.25	6.65	6.05	4.54	5.25	4.9	4.82	4.70	9.0	6.25
9.....	5.35	5.6	5.6	6.3	6.35	4.42	5.1	4.85	4.98	4.68	7.0	5.9
10.....	5.3	5.35	5.8	6.0	6.0	4.37	5.4	4.78	4.66	4.64	6.2	5.65
11.....	5.3	5.1	5.7	5.8	5.75	4.36	6.55	4.87	4.68	4.60	5.9	5.6
12.....	5.2	5.05	5.8	5.65	11.1	4.20	6.05	5.25	4.54	4.60	5.65	5.6
13.....	5.15	5.0	6.05	5.55	8.6	4.20	5.45	5.5	4.50	4.60	5.5	5.4
14.....	5.0	4.98	6.7	5.45	8.1	4.22	5.3	5.05	4.47	4.60	5.5	5.05
15.....	5.0	4.75	6.6	5.3	6.75	4.18	5.8	4.88	4.46	4.60	5.4	5.15
16.....	5.0	4.97	10.6	5.25	7.7	4.12	7.1	4.78	4.42	4.62	5.3	5.4
17.....	5.05	5.0	7.8	5.95	8.8	4.22	6.05	4.70	4.44	4.62	5.25	5.4
18.....	5.1	5.05	7.0	6.2	7.6	5.15	5.8	4.62	4.68	4.62	5.2	5.1
19.....	5.3	5.15	6.9	6.3	6.85	6.05	8.7	4.80	4.70	4.74	5.15	5.1
20.....	6.45	5.2	7.3	5.95	6.35	6.1	6.7	5.7	4.76	5.35	5.15	5.15
21.....	6.0	6.05	7.8	5.7	6.0	5.45	6.0	5.5	4.68	5.15	5.15	5.1
22.....	6.05	7.6	8.0	5.55	5.75	5.1	7.5	5.3	4.52	4.95	5.15	5.9
23.....	6.15	6.8	6.9	6.0	5.55	4.98	6.65	5.3	4.54	5.05	5.15	4.7
24.....	6.25	6.6	7.1	5.95	5.35	5.15	6.0	5.3	6.85	6.1	4.98	5.0
25.....	6.15	5.95	8.8	5.75	5.2	5.1	9.7	4.96	6.3	5.7	4.98	4.85
26.....	6.05	6.35	7.4	5.6	5.15	5.6	8.0	4.86	5.65	5.45	4.90	4.86
27.....	5.7	11.8	6.7	5.5	5.05	6.1	6.7	5.1	5.55	5.45	4.85	5.0
28.....	5.25	7.2	6.25	5.7	4.96	6.5	6.05	5.0	5.5	5.3	4.75	5.2
29.....	6.9	6.7	8.3	5.5	4.93	5.8	5.7	5.95	5.3	5.2	5.0	5.3
30.....	10.3	.....	8.6	5.8	4.92	5.45	5.9	5.8	5.3	5.1	4.68	5.4
31.....	7.7	.....	7.4	.....	4.83	.....	5.75	5.35	.....	5.1	.....	8.5

*Gage height to top of ice.

"NOTE.—Relation of gage height to discharge probably affected by ice Jan. 6-19 and possibly at times during February. The observer reported on Apr. 1 that the river did not freeze over at the bridge, probably because of being high and swift at the gage, during the cold periods, but that on the pools both above and below the gage at a distance of about 200 yards the ice ranged from about 10 inches thick at the banks to about 5 inches thick at the center; that on Feb. 27 the ice began to break up and quite a large quantity came down from above, after which date there was no ice.

"No discharge measurements of Gauley River at Allingdale, W. Va., in 1913 were made."

Daily gage height, in feet, of Gauley River at Allingdale,
W. Va., for the year ending Sept. 30, 1913.

(Harry Jones, observer).

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	5.15	5.0	4.80	6.2	6.6	6.4	6.1	6.25	7.6	5.05	4.61	4.44
2.....	5.05	5.15	4.89	6.3	6.15	6.2	5.9	5.95	6.65	4.95	4.62	4.35
3.....	5.0	5.15	5.2	6.7	6.3	5.8	5.7	5.75	5.95	4.77	4.47	4.30
4.....	4.90	5.05	5.5	6.6	8.5	5.85	5.6	5.55	5.8	6.25	4.37	4.26
5.....	4.84	5.0	5.9	6.2	7.2	5.7	5.55	5.4	5.65	5.4	4.35	4.24
6.....	4.78	4.98	6.4	7.2	6.2	5.6	5.5	5.35	5.4	6.0	4.31	4.14
7.....	4.75	5.05	6.5	9.1	6.05	5.35	5.35	5.3	5.35	5.95	4.28	4.22
8.....	4.70	9.0	6.25	10.1	6.0	5.2	5.3	5.2	6.6	5.5	4.26	4.79
9.....	4.68	7.0	5.9	9.1	5.9	5.4	5.25	5.15	6.55	5.25	4.26	4.76
10.....	4.64	6.2	5.65	7.4	6.0	5.45	5.2	5.05	6.0	5.35	4.27	4.56
11.....	4.60	5.9	5.6	6.7	5.85	6.0	5.2	4.95	5.6	6.15	4.26	4.43
12.....	4.60	5.65	5.6	6.5	7.3	7.0	6.0	4.92	5.45	5.3	4.86	4.36
13.....	4.60	5.5	5.4	7.4	6.4	6.55	6.0	4.87	5.25	5.45	5.35	4.34
14.....	4.60	5.5	5.05	6.7	6.25	7.2	6.3	4.85	5.1	5.3	5.1	4.27
15.....	4.60	5.4	5.15	6.2	6.0	7.7	8.1	4.85	5.0	5.2	4.76	4.14
16.....	4.62	5.3	5.4	6.0	5.9	7.3	8.1	4.89	4.87	5.5	4.76	4.15
17.....	4.62	5.25	5.4	5.8	5.6	6.6	7.1	5.25	4.87	5.35	4.59	4.25
18.....	4.62	5.2	5.1	5.7	5.85	6.2	6.4	6.0	4.75	5.15	4.61	4.99
19.....	4.74	5.15	5.1	5.7	5.7	5.95	6.1	5.6	4.62	5.15	4.71	4.74
20.....	5.35	5.15	5.15	5.65	5.3	5.8	6.0	5.45	4.59	5.95	5.1	4.71
21.....	5.15	5.15	5.1	5.5	5.45	5.65	5.7	5.3	4.59	5.35	4.76	5.45
22.....	4.95	5.15	5.9	6.0	5.8	5.65	5.55	5.55	4.54	5.15	4.83	5.4
23.....	5.05	5.15	4.7	6.75	6.15	5.3	5.55	5.65	4.69	5.05	6.5	5.25
24.....	6.1	4.98	5.0	6.1	5.8	5.35	5.4	8.9	4.85	5.45	5.8	5.2
25.....	5.7	4.98	4.85	7.1	5.65	5.35	5.5	7.1	4.72	5.35	5.15	4.96
26.....	5.45	4.90	4.86	6.85	5.5	5.65	5.25	6.4	7.4	5.25	4.96	4.16
27.....	5.45	4.85	5.0	6.45	5.6	11.0	5.5	9.4	5.5	5.15	4.85	4.56
28.....	5.3	4.75	5.2	6.15	6.25	8.7	6.3	10.3	5.4	5.0	4.70	4.57
29.....	5.2	5.0	5.3	5.9	.....	7.2	6.2	8.1	5.05	4.86	4.75	4.65
30.....	5.1	4.68	5.4	5.75	.....	6.7	6.7	6.95	4.97	4.76	4.56	4.68
31.....	5.1	.....	8.5	5.8	.....	6.3	.....	11.2	.....	4.68	4.50	.....

^aGage height to top of ice.

"NOTE—Observer made no notes relative to ice during 1913. Discharge relation probably not materially affected by ice during the year ending Sept. 30, 1913.

"Discharge measurement of Gauley River at Allingdale, W. Va., in 1914, was made by Peterson and Walters:

"December 1, 1913: Gage height, 5.97 feet; discharge, 701 second-feet."

Daily gage height, in feet, of Gauley River at Allingdale,
W. Va., for the year ending Sept. 30, 1914.

(Harry Jones, observer).

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	4.87	5.45	5.9	5.6	7.5	5.5	7.3	5.8	4.33	4.46	4.15	4.98
2.....	4.67	5.35	7.6	5.5	6.6	5.1	10.1	.....	5.35	4.29	4.13	4.81
3.....	6.0	5.25	6.85	5.45	6.2	5.0	8.6	.....	5.35	4.31	4.07	4.78
4.....	5.2	5.25	6.4	5.35	5.95	5.4	7.3	.....	5.3	4.17	4.05	4.45
5.....	5.4	5.15	6.1	5.4	5.85	5.3	6.6	.....	5.3	4.23	4.02	4.55
6.....	5.0	5.1	5.75	5.3	5.85	5.3	6.25	.....	5.35	4.18	4.09	4.46
7.....	4.91	5.0	6.0	5.3	6.3	5.3	5.95	.....	4.33	4.31	4.18	4.43
8.....	4.76	5.0	6.9	5.3	6.5	5.25	6.95	.....	4.31	4.26	5.25	4.43
9.....	5.05	5.7	6.35	5.7	6.0	5.1	8.4	.....	4.28	4.30	5.4	4.38
10.....	5.7	6.1	6.05	5.65	6.05	5.55	6.9	.....	4.28	4.11	4.84	4.45
11.....	5.55	5.9	5.9	6.2	5.8	5.3	6.4	.....	4.21	4.07	4.83	4.43
12.....	5.3	5.8	5.7	5.9	6.05	5.55	6.15	.....	4.18	4.06	4.80	4.43
13.....	5.3	6.05	5.6	6.2	5.4	5.65	5.95	.....	4.04	4.03	5.45	4.47
14.....	5.05	8.7	5.5	6.05	5.3	5.7	5.7	.....	4.08	4.23	4.95	4.48
15.....	4.92	10.4	5.4	5.6	5.25	5.55	5.6	.....	4.18	4.31	4.81	4.48
16.....	4.89	11.5	5.35	5.45	5.1	6.55	7.5	.....	4.16	4.83	4.63	4.38
17.....	4.88	10.0	5.3	5.45	5.35	8.1	7.7	.....	4.08	4.71	4.53	4.31
18.....	4.86	8.7	5.3	5.4	5.2	7.2	5.95	.....	4.08	4.58	4.43	4.24
19.....	5.55	6.75	5.5	5.3	6.3	6.1	6.4	.....	4.02	4.48	4.33	4.16
20.....	5.5	6.25	5.25	5.45	9.4	6.3	7.7	.....	3.98	4.36	4.28	4.47
21.....	6.95	5.95	5.3	9.7	7.3	6.0	7.8	.....	3.93	4.25	4.23	4.30
22.....	6.2	5.7	5.25	8.5	6.55	6.25	6.9	.....	4.08	4.15	4.67	4.18
23.....	6.25	5.55	5.2	6.5	6.25	5.7	6.45	.....	4.29	4.11	4.63	4.13
24.....	6.25	5.45	5.35	6.3	5.95	5.65	6.1	4.71	5.1	4.11	4.40	4.17
25.....	7.9	5.25	5.35	9.3	5.9	6.1	5.9	4.67	5.0	4.23	4.38	4.28
26.....	10.4	5.25	6.95	7.3	5.75	7.4	7.2	4.58	5.65	4.26	4.68	4.44
27.....	7.9	5.2	6.3	6.65	5.75	9.0	8.2	4.43	5.1	4.23	5.7	4.33
28.....	7.6	5.35	6.0	6.35	5.5	9.2	7.0	4.33	4.76	4.59	5.15	4.33
29.....	6.6	6.4	5.85	5.75	.....	8.4	6.4	4.53	4.55	4.26	5.65	4.26
30.....	6.15	5.0	5.75	7.1	.....	7.8	6.0	4.83	4.53	4.24	5.5	4.23
31.....	5.85	.....	5.6	7.4	.....	8.2	.....	4.88	.....	4.15	5.15	.....

"NOTE.—Discharge relation probably affected by ice about Jan. 13-18. No record May 2-23.

"Discharge measurement of Gauley River at Allingdale; W. Va., in 1915, was made by J. G. Mathers:

"November 21, 1914: Gage height, 4.74 feet; discharge, 90 second-feet. Gage height, 4.72 feet; discharge, 83 second-feet."

Daily gage height, in feet, of Gauley River at Allingdale,
W. Va., for the year ending Sept. 30, 1915.

(Harry Jones, observer).

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	4.16	4.83	4.78	6.2	7.7	5.75	5.25	6.15	6.2	4.98	5.35	4.93
2.....	4.13	4.70	5.5	5.95	12.2	5.6	5.2	5.8	5.95	4.95	5.55	4.86
3.....	4.12	4.71	5.65	5.8	10.5	5.6	5.25	5.65	8.8	4.88	5.5	5.08
4.....	4.11	4.70	5.7	5.8	7.8	5.4	5.2	5.55	7.5	4.84	5.3	5.40
5.....	4.15	4.68	7.8	6.0	7.1	5.45	5.10	5.45	6.3	4.80	5.1	6.06
6.....	4.17	4.66	6.7	6.35	6.75	5.6	5.2	5.35	6.3	5.5	4.80	5.85
7.....	4.15	4.61	5.95	12.7	6.45	5.6	6.4	5.25	5.8	5.2	4.81	5.43
8.....	4.43	4.07	5.75	8.1	6.1	5.55	6.8	5.25	5.6	5.05	4.80	5.23
9.....	4.41	4.58	5.5	6.8	5.85	5.35	6.55	5.35	5.45	5.5	4.80	5.10
10.....	4.58	4.58	5.35	6.2	6.0	5.4	6.4	5.05	5.2	5.2	4.75	4.98
11.....	4.67	4.56	5.50	5.95	6.2	5.45	6.35	4.96	5.05	5.1	4.72	4.88
12.....	4.65	4.53	5.4	6.7	5.75	5.45	6.6	4.91	5.05	5.1	4.73	4.78
13.....	4.61	4.45	5.25	6.45	5.55	5.8	6.15	4.95	5.0	5.85	5.7	5.68
14.....	4.59	4.48	5.2	5.95	5.9	5.4	5.9	4.95	9.3	4.91	5.1	5.18
15.....	5.2	4.07	4.93	6.2	6.35	5.4	5.7	4.88	6.7	4.95	5.0	4.88
16.....	5.1	5.7	4.70	6.35	7.9	5.45	5.6	4.73	6.2	4.9	5.25	4.78
17.....	5.55	5.55	4.93	6.15	6.7	5.6	5.55	4.78	6.2	6.55	5.4	4.68
18.....	5.15	5.25	5.05	9.2	6.25	5.45	5.35	4.70	5.75	7.7	6.15	4.66
19.....	4.98	5.1	5.2	10.6	5.95	5.6	5.35	4.70	5.75	5.75	5.4	4.58
20.....	4.86	4.93	7.8	7.8	5.7	5.4	5.3	4.68	5.3	5.7	5.25	3.98
21.....	4.75	4.71	6.7	6.7	5.6	5.4	5.25	4.85	5.1	6.25	5.2	5.18
22.....	4.68	4.80	8.0	6.3	5.15	5.25	4.86	4.95	5.35	5.9	5.45	5.48
23.....	4.60	4.65	6.45	6.05	5.4	5.2	5.15	5.1	5.1	5.55	5.3	5.13
24.....	4.15	4.56	6.55	6.95	5.55	5.15	5.3	5.45	4.9	5.35	5.35	4.98
25.....	4.93	4.70	6.8	6.45	7.0	5.1	5.25	5.3	4.78	5.25	5.35	4.83
26.....	5.3	4.75	5.7	6.3	6.35	5.15	5.15	5.8	4.68	5.0	5.3	4.83
27.....	5.1	4.70	5.5	6.05	6.05	5.6	5.1	5.95	4.65	5.1	5.05	5.13
28.....	4.95	4.70	5.35	5.8	5.85	5.5	5.95	5.5	4.57	4.85	5.05	5.03
29.....	4.87	4.68	5.4	5.8	.....	5.45	7.1	5.4	4.46	4.75	5.65	4.93
30.....	4.88	4.53	7.4	5.65	.....	5.4	6.55	6.25	4.52	5.0	5.25	4.08
31.....	4.90	.....	6.8	5.5	.....	5.3	.....	7.4	.....	5.8	5.10	.....

"NOTE.—No ice reported by observer.

"Discharge measurement of Gauley River at Allingdale, W. Va., in 1916, was made by B. E. Jones:

"September 4, 1916: Gage height, 4.48 feet; discharge, 48.4 second-feet."

Daily gage height, in feet, of Gauley River at Allingdale.
W. Va., for the year ending Sept. 30, 1916.

(Harry Jones, observer).

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	11.16	4.80	5.18	6.25	7.35	5.80	6.20	5.85	5.45	4.90	4.57	4.55
2.....	8.18	4.90	5.33	8.85	7.55	5.80	6.05	5.65	5.31	4.90	6.95	5.41
3.....	7.28	4.48	5.28	7.30	6.20	5.81	5.80	5.46	5.70	4.90	5.40	4.39
4.....	6.38	4.68	5.28	6.50	6.00	5.73	5.70	5.61	6.57	4.69	5.03	4.43
5.....	5.90	4.60	5.13	6.15	6.19	5.63	5.55	5.95	5.95	5.15	6.35	4.36
6.....	5.83	4.50	5.18	6.05	5.77	5.80	5.38	5.80	6.70	4.90	5.40	4.26
7.....	5.15	4.63	5.28	6.00	6.85	8.10	5.35	5.61	6.15	4.75	5.41	4.18
8.....	5.33	4.58	5.13	6.10	6.29	9.05	5.35	5.50	6.40	4.78	5.53	4.74
9.....	5.25	4.60	4.98	5.95	6.46	7.00	5.32	9.45	6.47	4.59	6.46	4.62
10.....	5.16	4.63	4.93	5.85	6.20	6.50	5.40	5.90	6.26	4.65	7.51	4.53
11.....	5.08	4.61	4.78	8.25	5.99	6.15	5.57	5.60	5.87	5.25	6.26	4.37
12.....	5.28	4.68	5.08	10.00	6.10	5.93	5.54	5.60	5.47	4.90	7.12	4.28
13.....	4.94	4.73	4.98	7.90	6.58	5.90	7.00	5.39	5.40	4.65	6.27	4.23
14.....	4.75	4.98	4.93	7.70	6.40	6.20	6.74	5.31	5.33	4.61	7.01	4.17
15.....	4.45	6.13	4.88	6.60	6.20	8.40	6.35	5.30	5.52	4.58	6.19	7.50
16.....	4.77	6.98	4.98	6.38	6.05	7.10	5.98	5.10	6.25	4.46	5.85	6.28
17.....	4.70	6.18	6.48	6.50	5.95	6.70	6.55	5.21	7.30	4.77	7.15	5.32
18.....	6.48	5.73	10.48	6.40	5.65	6.25	6.85	5.30	6.00	5.49	5.77	5.54
19.....	6.45	5.83	8.58	5.60	5.64	6.18	5.55	5.14	5.52	5.10	5.57	4.55
20.....	5.88	6.58	7.23	5.55	5.46	5.85	5.50	5.08	5.35	5.00	5.52	4.45
21.....	5.04	6.33	6.33	5.95	5.65	5.95	5.39	4.99	5.35	4.90	5.36	4.72
22.....	5.41	6.08	5.98	6.45	5.75	6.15	5.53	4.95	5.45	7.30	5.08	4.65
23.....	5.34	5.88	5.83	7.65	5.75	8.65	5.65	5.05	5.21	5.75	5.89	4.60
24.....	5.21	5.70	5.58	6.70	5.95	7.26	5.56	6.33	5.05	5.97	5.25	4.46
25.....	5.15	5.58	5.81	6.20	6.25	6.65	5.75	5.56	6.18	5.35	5.07	4.52
26.....	5.07	5.28	6.33	5.90	6.65	6.69	6.91	5.40	6.40	5.02	4.93	4.47
27.....	5.03	5.46	5.98	5.85	6.28	6.70	6.70	5.93	5.62	4.95	4.80	4.42
28.....	5.00	5.78	6.08	5.75	5.95	6.80	6.47	5.41	5.43	4.85	4.38	4.37
29.....	4.94	5.63	7.98	5.90	5.75	7.25	6.30	5.30	5.20	5.13	4.76	5.40
30.....	4.90	5.43	8.83	7.16	.....	6.71	6.04	5.40	5.00	4.92	4.64	6.40
31.....	4.80	.....	7.23	6.60	.....	6.50	.....	6.10	.....	4.73	4.57	.....

"Gauley River at Belva, W. Va.

"This station is located about one-half mile below Belva, W. Va. It was established August 25, 1908, to obtain data for use in studying water power, water supply, pollution, flood control, and storage problems.

"Twentymile Creek enters on the right bank about one-eighth mile above the station. The drainage area above the section is about 1,420 square miles.

"The gage datum has remained unchanged. The records are reliable and accurate. Sufficient data have not been obtained to enable estimates of the flow to be made."

Discharge measurements of Gauley River at
Belva, W. Va., in 1908.

Date	Hydrographer	Width Feet	Area of section Sq. Ft.	Gage height Feet	Dis- charge Sec. Ft.
August 26.....	W. G. Hoyt.....	220	868	2.05	349
September 22 ^a ...	W. M. O'Neill.....	48	48	.94	50

^aWading measurement.

Daily gage height, in feet, of Gauley River at
Belva, W. Va., for 1908.

(Observer, L. L. Davis).

Day	Aug.	Sept.	Oct.	Nov.	Dec.	Day	Aug.	Sept.	Oct.	Nov.	Dec.
1.....		2.27	0.74	2.47	1.71	16.....		1.24	1.34	1.62	3.06
2.....		1.97	.76	2.32	1.70	17.....		1.19	1.31	1.62	2.84
3.....		1.85	.75	2.12	1.72	18.....		1.14	1.26	1.57	2.78
4.....		1.77	.76	1.92	1.78	19.....		1.09	1.18	1.55	5.02
5.....		1.71	.78	1.86	1.80	20.....		1.04	1.10	1.54	4.78
6.....		1.65	1.00	1.74	1.78	21.....		.99	1.05	1.51	4.00
7.....		1.62	1.06	1.69	1.80	22.....		.94	1.02	1.75	3.62
8.....		1.58	.98	1.56	1.95	23.....		.90	.98	2.04	3.50
9.....		1.56	.90	1.49	3.02	24.....		.84	.92	2.02	3.38
10.....		1.54	.96	1.46	2.85	25.....		.82	.90	2.00	3.38
11.....		1.46	1.00	1.40	2.70	26.....		.80	.84	1.94	4.22
12.....		1.46	.95	1.38	2.85	27.....	1.99	.78	.82	1.89	4.25
13.....		1.39	.90	1.40	5.28	28.....	2.90	.76	.81	1.84	3.80
14.....		1.34	.90	1.42	4.12	29.....	2.54	.74	1.49	1.78	3.60
15.....		1.29	.93	1.52	3.45	30.....	2.28	.72	1.46	1.74	3.50
						31.....	2.17		1.44		4.48

“NOTE.—Gage heights September 13-22 have been interpolated by comparison of other Gauley River stations.

“Discharge measurement of Gauley River at Belva, W. Va., in 1909, was made by H. J. Jackson:

“April 1, 1909: Width, 258 feet; area, 1,620 square feet; gage height, 4.98 feet; discharge, 3,990 second-feet.”

Daily gage height, in feet, of Gauley River at
Belva, W. Va., for 1909.

(L. L. Davis and C. L. Davis, observers).

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	5.50	3.50	4.87	5.08	7.60	3.06	4.32	2.29	1.26	1.84	2.58	2.56
2.....	4.63	3.70	4.46	4.72	8.00	2.85	5.55	2.34	1.21	1.78	2.48	2.52
3.....	4.06	3.52	4.34	4.74	6.75	2.71	4.65	2.30	1.19	1.69	2.45	2.50
4.....	3.78	3.43	5.32	4.90	5.82	2.72	3.80	2.25	1.15	1.62	2.46	2.47
5.....	3.58	3.48	4.59	5.32	5.21	2.78	3.30	2.14	1.50	1.56	2.39	2.45
6.....	6.34	3.89	5.18	5.74	4.76	3.22	3.34	2.02	1.35	1.50	2.30	2.42
7.....	6.20	4.99	6.15	5.54	4.30	3.28	5.11	1.89	2.08	1.44	2.24	2.39
8.....	5.30	4.84	7.58	4.94	4.12	3.00	4.70	1.80	1.92	1.39	2.21	2.40
9.....	5.06	4.49	7.05	4.40	4.68	2.80	4.00	1.71	1.88	1.32	2.34	2.60
10.....	4.04	6.48	8.30	4.10	4.54	4.25	3.50	1.65	2.02	1.29	4.24	2.68
11.....	3.76	7.22	7.96	3.82	6.85	4.71	3.08	1.69	2.28	1.38	4.82	2.45
12.....	3.60	5.97	6.38	3.54	5.98	4.65	2.78	1.74	2.81	1.36	4.26	2.48
13.....	3.70	5.30	5.60	3.48	5.22	4.00	2.74	1.69	2.61	3.55	3.74	2.68
14.....	3.48	5.38	5.90	7.00	4.62	3.72	3.30	1.64	2.32	2.86	3.38	4.54
15.....	6.49	5.52	6.00	8.08	4.12	3.82	3.41	1.62	2.10	2.52	3.14	5.30
16.....	8.50	7.55	5.44	6.40	3.77	4.41	3.11	1.63	1.94	2.36	2.94	4.52
17.....	7.64	8.38	4.94	5.40	3.48	4.21	2.86	2.58	3.70	2.38	2.82	3.96
18.....	6.45	6.75	4.25	4.74	3.22	4.22	2.66	3.08	2.90	2.46	2.72	3.58
19.....	5.45	6.36	4.05	4.29	3.00	4.52	2.65	2.75	2.51	2.32	2.62	3.25
20.....	4.82	5.83	3.92	4.26	2.88	3.85	2.55	2.46	2.30	2.26	2.52	2.90
21.....	4.52	6.15	3.68	5.05	2.81	3.40	2.43	2.27	2.12	2.55	2.44	3.01
22.....	4.42	6.52	5.70	7.30	2.82	3.18	2.34	2.12	1.98	2.40	2.40	3.12
23.....	4.34	6.42	5.45	8.58	3.45	3.11	2.52	1.96	1.88	2.36	2.40	3.55
24.....	4.46	6.02	4.92	8.05	3.08	3.45	2.68	1.86	1.80	2.46	2.55	3.35
25.....	4.42	6.90	5.24	6.70	2.89	3.78	2.85	1.76	2.42	4.00	2.90	3.32
26.....	4.17	6.29	7.58	5.73	2.88	3.58	2.80	1.68	2.71	3.57	2.82	3.30
27.....	4.12	5.76	7.01	5.14	4.00	3.12	2.50	1.59	2.38	3.38	2.68	3.15
28.....	3.92	5.34	7.76	5.20	4.17	3.38	2.42	1.52	2.18	3.25	2.58	3.00
29.....	3.77	.....	7.72	5.48	4.05	3.30	2.35	1.45	2.06	3.05	2.51	2.83
30.....	3.90	.....	6.52	5.46	3.70	3.51	2.40	1.38	1.95	2.86	2.50	2.72
31.....	3.75	.....	5.70	.....	3.35	.....	2.35	1.31	.....	2.70	.....	2.62

“NOTE.—Ice conditions the latter part of December. December 28, thickness of ice 0.25 foot.”

Discharge measurements of Gauley River at
Belva, W. Va., in 1910.

Date	Hydrographer	Width Feet	Area of section Sq. Ft.	Gage height Feet	Dis- charge Sec. Ft.
March 8.....	Horton and Bailey...	251	1,320	4.40	3,350
August 26.....	C. T. Bailey.....	90	107	1.95	328

*Measurement not at regular section.

Daily gage height, in feet, of Gauley River at
Belva, W. Va., for 1910.

(C. L. Davis, observer).

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	2.62	3.88	6.85	2.68	4.12	3.28	3.56	2.56	1.65	3.00	2.58	4.45
2.....	2.86	3.55	7.16	2.61	3.82	3.34	3.22	2.38	1.76	2.88	2.54	3.90
3.....	5.55	3.75	6.55	2.60	3.58	3.74	3.08	2.26	2.38	2.76	2.59	3.52
4.....	8.60	4.80	5.75	2.62	3.41	3.53	4.12	2.34	3.14	2.52	2.78	3.41
5.....	6.60	4.82	5.15	2.85	3.30	3.65	5.20	2.18	3.65	2.35	2.62	3.35
6.....	5.54	4.48	4.80	3.39	3.16	7.22	4.58	2.11	4.12	2.22	2.71	4.12
7.....	8.72	3.85	4.58	3.18	3.04	7.30	4.28	2.05	3.70	2.14	2.64	4.38
8.....	7.80	3.62	4.38	3.10	3.06	5.92	5.26	2.02	3.19	2.12	2.59	3.86
9.....	6.00	3.60	4.00	3.02	3.58	4.95	5.04	1.96	3.85	2.62	2.54	3.50
10.....	5.18	3.88	3.76	2.92	4.88	4.82	4.18	1.94	3.32	3.51	2.48	3.28
11.....	4.38	4.22	3.74	2.84	4.56	5.26	3.66	1.92	2.82	3.12	2.38	3.27
12.....	3.95	4.12	3.68	2.89	6.28	5.69	3.38	1.88	2.62	2.88	2.35	3.26
13.....	3.71	3.92	3.62	3.40	7.85	6.60	5.90	1.80	2.68	2.57	2.31	3.00
14.....	3.94	3.68	3.73	4.63	6.19	6.56	6.02	1.75	4.00	2.42	2.26	2.90
15.....	4.52	3.65	3.90	4.27	5.18	6.36	5.62	1.98	4.00	2.26	2.24	2.85
16.....	4.24	4.20	3.71	4.03	4.51	9.50	4.52	2.00	3.34	2.20	2.22	2.80
17.....	3.92	6.40	3.54	3.82	4.00	12.95	4.20	1.90	2.92	2.12	2.25	3.08
18.....	4.50	8.30	3.48	4.26	3.86	8.18	3.94	1.78	2.65	2.08	2.21	3.02
19.....	8.75	7.21	3.29	4.85	4.02	6.50	4.11	1.74	2.52	2.01	2.18	2.82
20.....	7.12	6.11	3.11	5.01	3.88	6.25	4.01	1.71	2.38	1.96	2.08	3.40
21.....	6.82	5.38	3.08	6.00	3.84	5.15	3.60	1.70	2.29	1.90	2.04	4.08
22.....	8.15	4.88	3.14	7.22	4.10	5.30	3.24	1.65	2.25	1.90	2.01	3.90
23.....	6.42	6.48	3.18	6.95	4.13	4.80	2.95	1.60	2.18	1.98	2.05	3.50
24.....	5.55	5.90	3.02	7.58	4.00	4.32	2.75	1.60	2.08	2.61	2.04	4.30
25.....	4.92	5.24	3.06	7.07	4.75	3.88	2.56	2.05	2.01	2.45	2.09	5.45
26.....	4.45	4.58	2.99	6.12	4.55	3.52	2.50	2.00	3.78	2.26	2.49	4.65
27.....	4.58	4.20	2.98	5.38	4.15	4.11	3.25	1.81	3.98	2.18	3.12	4.18
28.....	5.26	4.08	2.90	5.00	3.77	5.15	3.12	1.72	3.90	2.29	3.20	3.82
29.....	5.08	.....	2.84	4.72	3.50	4.75	3.10	1.64	3.89	2.62	5.38	4.05
30.....	4.45	.....	2.79	4.49	3.31	4.02	2.86	1.60	3.32	2.82	5.26	10.08
31.....	4.15	.....	2.74	.....	3.29	.....	2.62	1.61	.....	2.66	.....	8.65

“NOTE.—Relation of gage height to discharge affected by ice about Dec. 16 to 23. Jan. 12, Feb. 8, and Dec. 17, observer reported ice along shores.”

Discharge measurements of Gauley River near
Belva, W. Va., in 1911.

Date	Hydrographer	Gage height Feet	Dis-charge Sec. Ft.
October 15.....	Bailey and Perwien.....	4.37	2,830
October 16.....	Bailey and Perwien.....	6.50	6,730

Daily gage height, in feet, of Gauley River near
Belva, W. Va., for 1911.

(C. L. Davis, observer).

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	7.25	8.25	3.80	4.92	3.80	2.10	2.34	1.48	2.66	2.45	2.65	4.30
2.....	9.95	7.78	3.68	4.78	3.70	2.92	2.12	1.38	2.92	2.68	2.55	3.98
3.....	10.95	6.78	3.58	4.78	3.70	2.68	1.96	1.31	2.52	5.42	2.49	3.75
4.....	9.10	6.02	3.35	6.62	3.60	2.38	1.88	1.22	2.25	4.58	2.36	3.55
5.....	7.10	5.45	3.35	8.95	3.45	2.25	2.10	1.18	2.62	3.89	2.31	3.22
6.....	5.72	4.95	6.10	9.30	3.20	2.42	2.00	1.09	2.42	3.42	2.84	3.00
7.....	5.01	4.62	11.00	7.41	3.12	2.58	1.90	1.04	2.42	3.12	6.18	3.00
8.....	4.48	4.35	8.42	6.35	3.02	2.40	1.92	1.12	2.32	4.88	6.20	3.00
9.....	4.12	4.60	6.70	7.08	2.98	2.24	2.88	1.76	2.20	4.30	5.12	2.95
10.....	3.75	5.22	6.05	7.05	2.92	2.08	2.41	2.05	3.30	3.30	4.45	2.92
11.....	3.55	4.96	6.00	6.22	2.86	1.98	2.30	1.98	3.12	4.42	3.95	3.01
12.....	3.65	4.61	5.70	5.51	2.82	1.88	2.60	1.75	3.58	5.00	3.65	3.05
13.....	7.28	4.36	5.39	5.08	2.72	1.88	2.70	1.65	3.38	4.68	4.08	3.10
14.....	9.68	4.05	5.95	4.92	2.58	2.70	2.58	1.58	3.08	4.15	4.45	3.10
15.....	7.76	3.72	5.82	7.00	2.49	2.50	2.28	1.50	2.82	4.20	4.22	3.05
16.....	8.65	3.58	5.08	6.55	2.42	2.34	2.08	1.52	4.60	6.39	4.00	3.30
17.....	6.95	3.38	4.62	5.82	2.35	2.20	1.95	1.68	4.80	5.28	3.70	4.08
18.....	5.80	3.28	4.00	5.38	2.34	2.20	1.82	1.85	4.00	9.55	3.85	4.38
19.....	5.00	3.33	4.31	4.68	2.30	2.18	1.72	1.92	3.34	7.88	5.38	4.02
20.....	4.56	3.90	6.30	5.42	2.24	2.34	1.70	1.78	3.04	6.05	5.18	3.75
21.....	4.50	4.34	5.85	6.85	2.19	2.40	1.70	1.65	2.90	5.00	4.61	3.55
22.....	7.32	4.10	5.75	6.72	2.14	2.28	1.70	1.56	3.12	4.25	4.14	3.50
23.....	7.28	3.90	5.50	7.28	2.09	2.12	1.62	1.45	3.08	4.02	3.78	3.92
24.....	6.12	3.72	5.15	6.58	2.02	2.00	1.68	1.34	2.88	4.30	3.65	5.42
25.....	5.42	3.52	4.62	5.72	2.15	1.88	1.68	1.28	2.62	3.88	4.05	5.35
26.....	5.38	3.50	4.35	5.15	2.25	2.04	1.65	1.18	2.40	3.56	4.25	5.25
27.....	8.48	3.50	4.25	4.66	2.12	2.25	1.78	1.14	2.38	3.35	4.15	5.75
28.....	7.72	3.58	4.72	4.24	2.02	2.30	1.80	1.11	2.19	3.17	4.18	6.35
29.....	7.80	.....	4.42	4.00	1.99	2.65	1.72	1.08	2.25	2.96	4.54	5.72
30.....	16.00	.....	4.40	3.85	2.18	2.55	1.62	1.18	2.48	2.86	4.68	4.92
31.....	10.55	.....	4.88	.....	2.15	.....	1.54	1.58	.....	2.76	.....	4.70

“NOTE.—Observer made no notes concerning ice. Relation of gage height to discharge probably not affected by ice during 1911.”

Discharge measurements of Gauley River near
Belva, W. Va., in 1912.

Date	Hydrographer	Gage height Feet	Dis- charge Sec. Ft.
April 2.....	C. T. Bailey.....	6.16	^a 6,460
September 11....	C. T. Bailey.....	2.12	^b 342

^aAt Kanawha & Michigan Railroad bridge 5 miles below gage; increase in drainage area about 1 per cent.

^bWading measurement.

Daily gage height, in feet, of Gauley River near
Belva, W. Va., for 1912.

(C. L. Davis, observer).

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	6.3	5.8	5.4	6.4	5.6	2.4	3.5	4.6	4.0	2.95	2.55	2.2
2.....	5.6	5.2	4.6	6.6	5.2	2.4	3.1	4.3	3.4	2.8	2.55	2.55
3.....	5.0	4.6	4.3	8.3	4.8	2.3	2.8	3.7	3.1	2.65	2.6	2.5
4.....	4.6	4.0	4.0	7.2	4.4	2.25	3.3	3.3	2.85	2.5	2.5	3.4
5.....	4.1	3.6	3.8	6.2	4.0	2.2	4.0	2.95	3.0	2.4	2.4	4.4
6.....	3.6	3.3	3.6	5.4	3.9	2.2	4.2	2.75	2.8	2.3	2.4	5.4
7.....	3.7	3.4	3.5	4.9	4.5	2.1	3.8	2.55	2.65	2.2	3.5	5.6
8.....	4.3	3.7	3.45	5.2	5.6	1.98	3.25	2.45	2.5	2.1	9.1	5.2
9.....	4.7	3.8	4.0	5.1	5.5	1.91	2.95	2.4	2.4	2.05	6.8	4.6
10.....	4.7	3.8	5.0	4.8	5.0	1.86	3.0	2.35	2.2	2.0	5.3	4.2
11.....	4.5	3.7	5.1	4.4	4.5	1.81	3.4	2.3	2.1	1.95	4.4	3.8
12.....	4.3	3.4	5.2	4.1	9.0	1.72	4.0	2.4	2.05	1.91	4.1	3.6
13.....	4.0	3.1	7.5	3.8	9.4	1.62	3.5	3.4	1.98	1.85	3.9	3.2
14.....	3.9	2.85	7.7	3.7	7.4	1.60	3.0	3.15	1.88	1.82	3.6	2.75
15.....	3.8	2.8	10.3	3.5	6.6	1.54	2.85	2.7	1.85	1.78	3.6	3.1
16.....	3.8	2.7	13.8	3.6	9.0	1.48	4.0	2.45	1.78	1.71	3.4	3.05
17.....	4.1	2.7	9.1	4.3	10.2	1.45	3.8	2.3	1.74	1.75	3.1	3.0
18.....	4.2	2.7	7.1	4.6	7.8	1.55	7.4	2.2	1.75	1.78	3.0	2.9
19.....	4.9	2.9	6.2	5.2	6.5	2.3	7.3	2.45	1.88	1.78	2.95	2.9
20.....	6.8	3.3	6.3	4.8	5.5	3.4	5.5	3.25	1.95	1.72	2.9	2.9
21.....	5.5	4.4	7.2	4.4	4.8	3.4	4.2	4.0	1.9	3.0	2.55	2.7
22.....	4.8	7.8	7.2	4.1	4.3	2.9	3.5	4.6	1.9	2.7	2.8	2.55
23.....	4.2	6.8	6.4	4.4	3.8	2.55	4.3	4.0	2.75	2.55	2.7	2.4
24.....	4.0	6.0	6.8	4.5	3.5	2.6	3.7	3.4	3.7	3.5	2.65	2.6
25.....	3.8	5.2	9.0	4.3	3.2	2.9	6.8	3.0	4.1	4.4	2.6	2.5
26.....	3.6	6.4	7.4	4.0	3.1	3.0	7.6	2.9	3.8	3.7	2.6	3.15
27.....	3.6	12.2	6.3	4.2	3.0	3.5	5.9	3.5	3.5	3.4	2.6	2.65
28.....	3.5	8.4	5.4	4.8	2.8	5.6	5.2	3.25	3.6	3.15	2.5	3.0
29.....	3.6	6.6	7.4	4.8	2.7	5.0	4.2	3.9	3.3	2.95	2.4	3.4
30.....	7.0	.....	8.8	5.1	2.6	3.9	4.4	6.5	3.1	2.75	2.3	4.5
31.....	7.0	.....	7.8	.....	2.5	.....	4.6	4.8	.....	2.6	.....	9.2

"NOTE.—Relation of gage height to discharge probably affected by ice Jan. 7-19 and Feb. 7-18. Observer reported as follows: Jan. 16, river entirely frozen over; ice about 4 inches thick, control partly frozen; Jan. 20, no ice; Feb. 4, river open in middle, ice along shore 2 inches thick, control open; Feb. 11, ice along shore 4 inches thick, ice broken up at control; Feb. 21, no ice."

"No discharge measurements were made at this station during the year ending September 30, 1913."

Daily gage height, in feet, of Gauley River near Belva, W. Va.,
for the year ending Sept. 30, 1913.

(C. L. Davis, observer).

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	2.95	2.55	2.2	6.9	5.2	5.4	4.9	5.0	6.4	2.55	2.3	1.99
2.....	2.8	2.55	2.35	5.6	5.4	5.1	4.4	4.6	5.4	2.65	2.25	1.92
3.....	2.65	2.6	2.5	5.3	5.4	4.7	4.1	4.2	4.5	2.55	2.15	1.82
4.....	2.5	2.5	3.4	5.9	8.8	4.3	3.7	3.9	4.2	3.2	2.15	1.74
5.....	2.4	2.4	4.4	5.4	7.6	4.1	3.7	3.6	4.4	3.6	2.05	1.68
6.....	2.3	2.4	5.4	6.3	6.1	3.9	3.5	3.45	4.0	4.7	1.93	1.62
7.....	2.2	3.5	5.6	9.6	5.3	3.7	3.4	3.35	3.8	5.3	1.84	1.59
8.....	2.1	9.1	5.2	14.5	4.4	3.45	3.25	3.35	5.8	4.0	1.78	1.92
9.....	2.05	6.8	4.6	11.7	4.2	3.4	3.1	3.2	6.4	3.25	1.72	2.6
10.....	2.0	5.3	4.2	7.8	3.9	3.35	3.05	3.0	5.4	3.05	1.66	2.5
11.....	1.95	4.4	3.8	6.5	4.0	4.3	3.05	2.9	4.5	4.6	1.69	2.2
12.....	1.91	4.1	3.6	5.9	6.4	6.1	3.25	2.8	4.0	3.8	1.84	2.0
13.....	1.85	3.9	3.2	6.8	6.0	5.9	4.3	2.7	3.6	3.25	1.79	1.92
14.....	1.82	3.6	2.75	6.1	5.2	7.6	4.5	2.65	3.3	3.1	2.65	1.82
15.....	1.78	3.6	3.1	5.3	4.7	8.4	10.7	2.6	3.0	2.95	2.85	1.75
16.....	1.71	3.4	3.05	4.8	4.4	7.6	9.1	2.65	2.8	3.35	2.45	1.69
17.....	1.75	3.1	3.0	4.3	4.0	6.4	7.0	3.0	4.8	3.6	2.2	1.65
18.....	1.78	3.0	2.9	4.2	3.8	5.4	5.7	4.9	3.35	3.2	2.05	1.64
19.....	1.78	2.95	2.9	4.1	3.6	4.8	5.0	4.4	2.75	3.35	2.3	1.72
20.....	1.72	2.9	2.9	3.9	3.45	4.4	4.6	3.0	2.5	6.4	2.65	2.25
21.....	3.0	2.85	2.7	4.1	3.5	4.1	4.2	4.0	2.35	5.9	3.0	2.2
22.....	2.7	2.8	2.55	4.9	3.8	3.9	3.9	4.4	2.3	4.0	2.7	5.3
23.....	2.55	2.7	2.4	4.8	4.3	3.7	3.7	4.9	2.35	3.45	3.6	4.1
24.....	3.5	2.65	2.6	5.0	4.2	3.5	3.5	9.1	2.75	3.1	4.6	3.3
25.....	4.4	2.6	2.5	6.2	4.0	3.4	3.45	7.4	2.75	3.8	3.6	2.9
26.....	3.7	2.6	3.15	6.6	3.7	3.5	3.25	5.8	3.05	3.8	3.1	2.6
27.....	3.4	2.6	2.65	6.2	3.7	11.3	3.45	6.9	4.15	3.25	2.7	2.4
28.....	3.15	2.5	3.0	5.9	4.2	10.1	4.6	10.6	3.45	2.95	2.5	2.25
29.....	2.95	2.4	3.4	5.3	.....	7.0	4.9	8.1	2.95	2.85	2.3	2.15
30.....	2.75	2.3	4.5	4.8	.....	6.3	5.2	6.6	2.7	2.6	2.15	2.15
31.....	2.6	.....	9.2	4.7	.....	5.5	.....	7.3	.....	2.4	2.05	.....

"NOTE.—Observer made no report concerning ice. Discharge relation probably not affected by ice during the year ending Sept. 30, 1913.

"The following discharge measurement was made at Gauley Bridge, about 5 miles below the gage, by Peterson and Walters:

"November 21, 1913: Gage height, 4.69 feet; discharge, 3,540 second-feet."

Daily gage height, in feet, of Gauley River near Belva, W. Va.,
for the year ending Sept. 30, 1914.

(C. L. Davis, observer).

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	2.35	3.4	5.3	4.2	7.4	4.0	6.6	4.5	1.82	1.59	.....	2.7
2.....	2.75	3.2	7.6	4.0	6.0	3.75	8.0	4.1	1.82	1.49	1.37	2.55
3.....	2.8	3.05	7.2	3.95	5.3	3.4	8.2	3.8	1.78	1.39	1.28	2.45
4.....	4.1	2.95	5.9	3.85	4.8	3.5	6.8	3.6	1.73	1.33	1.20	2.4
5.....	4.0	2.8	5.2	3.8	4.5	3.8	5.7	3.8	1.82	1.25	1.14	2.25
6.....	3.4	2.65	4.6	3.75	4.5	3.85	5.1	6.1	1.81	1.15	1.04	1.95
7.....	3.0	2.6	4.6	3.7	5.2	4.2	4.6	6.7	1.77	1.05	1.00	1.88
8.....	2.7	2.6	6.0	3.8	5.8	4.0	5.0	5.9	1.77	1.17	.94	1.82
9.....	2.55	2.95	5.6	4.7	5.2	3.85	9.0	5.4	1.73	1.37	.91	1.81
10.....	2.75	4.8	5.1	6.4	4.8	3.6	7.0	4.9	1.67	1.14	1.14	1.81
11.....	3.1	4.6	4.7	6.2	4.4	3.9	5.9	4.6	1.61	.99	1.84	1.81
12.....	2.95	4.4	4.3	5.4	4.0	5.0	5.1	4.2	1.55	.93	2.1	1.81
13.....	2.8	4.9	4.0	4.5	3.65	4.8	4.6	3.95	1.45	.92	2.0	1.84
14.....	2.75	8.0	3.75	4.3	3.55	4.8	4.3	3.75	1.41	.....	2.45	1.91
15.....	2.6	11.3	3.6	4.2	3.5	5.1	4.2	3.55	1.36	.....	2.35	1.87
16.....	2.5	13.2	3.5	4.1	3.6	6.6	7.4	3.35	1.45	.....	2.1	1.83
17.....	2.4	12.5	3.4	4.2	3.75	8.6	9.0	3.15	1.39	.....	1.92	1.77
18.....	2.35	8.5	3.3	4.2	3.5	9.0	7.1	3.0	1.29	.....	1.78	1.63
19.....	2.4	6.5	3.3	4.0	7.1	7.3	5.9	2.85	1.22	.....	1.67	1.54
20.....	3.25	5.4	3.3	4.2	11.8	6.3	8.7	2.75	1.15	.....	1.58	1.50
21.....	5.4	4.7	3.2	9.1	8.0	5.3	6.5	2.65	1.03	.....	1.62	1.43
22.....	5.0	4.3	3.15	8.5	6.8	5.0	7.7	2.55	.96	.....	1.55	1.37
23.....	4.4	3.85	3.1	6.4	5.7	4.7	5.7	2.5	.91	.....	1.97	1.29
24.....	4.4	3.65	3.05	5.7	5.3	4.7	5.1	2.45	.89	.....	1.98	1.25
25.....	7.0	3.4	3.15	8.6	4.6	4.9	4.6	2.35	.89	.....	1.88	1.20
26.....	11.0	3.25	4.0	8.0	4.4	7.0	6.8	2.25	1.03	.....	1.92	1.14
27.....	7.7	3.1	5.6	6.6	4.2	9.2	8.6	2.15	2.25	.....	3.25	1.13
28.....	6.0	3.4	5.0	5.7	4.0	9.1	6.6	2.1	2.15	.....	3.4	1.13
29.....	5.0	5.7	4.6	5.5	.....	8.6	5.6	1.99	1.92	.....	3.0	1.13
30.....	4.4	5.5	4.4	5.8	.....	7.9	5.0	1.93	1.72	.....	3.2	1.21
31.....	3.85	.....	4.3	6.2	.....	7.3	.....	1.85	.....	.....	2.85	.....

"NOTE.—Discharge relation probably affected by ice Feb. 13-18 and Mar. 2-5.

"The following discharge measurements were made by wading, by Mathers and Morgan:

"November 5, 1914: Gage height, 2.06 feet, discharge, 316 second-feet.

"November 11, 1914: Gage height, 1.83 feet; discharge, 206 second-feet."

Daily gage height, in feet, of Gauley River near Belva, W. Va.,
for the year ending Sept. 30, 1915.

(Stephen Elliott, observer).

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	1.26	2.25	1.98	.....	.....	4.3	3.50	5.62	5.14	1.81	2.66	2.45
2.....	1.19	2.25	2.55	.....	.....	4.0	3.30	4.82	4.44	1.93	2.66	2.33
3.....	1.11	2.15	3.25	.....	.....	3.8	3.25	4.39	4.26	2.50	2.96	2.21
4.....	1.06	2.15	3.6	.....	.....	3.65	3.21	4.69	5.51	2.47	3.42	2.55
5.....	1.01	2.05	5.8	.....	.....	3.6	3.13	4.61	4.88	2.39	2.99	4.18
6.....	.90	2.0	6.9	.....	.....	4.3	3.02	4.28	4.81	3.08	2.60	4.41
7.....	.94	1.96	5.4	.....	.....	4.5	3.08	3.97	3.71	3.23	2.44	3.93
8.....	.91	1.89	4.3	.....	.....	4.4	4.46	3.73	3.46	2.85	2.26	3.35
9.....	.93	1.86	4.2	.....	4.9	4.3	4.38	3.51	3.28	2.77	2.20	3.02
10.....	1.17	1.82	4.0	.....	4.4	4.0	4.34	3.25	3.04	3.24	2.12	2.76
11.....	1.33	1.82	3.9	.....	4.1	4.0	4.36	3.05	2.78	2.96	2.09	2.58
12.....	1.25	1.83	3.7	.....	4.0	4.1	4.38	2.92	2.67	2.83	2.13	2.31
13.....	1.30	1.82	3.5	.....	3.9	3.95	4.19	2.85	2.56	2.89	2.08	2.21
14.....	1.51	1.76	3.3	.....	4.1	3.75	3.96	2.83	3.11	2.69	3.12	2.19
15.....	1.49	1.74	3.15	.....	5.3	3.7	3.70	2.73	5.86	2.43	2.59	2.09
16.....	1.54	1.74	3.15	.....	7.5	3.9	3.56	2.62	5.11	2.35	2.62	2.35
17.....	2.95	2.25	3.15	.....	6.2	4.3	3.43	2.55	4.34	2.45	2.74	2.10
18.....	3.1	2.85	3.15	.....	5.4	4.3	3.31	2.48	3.78	5.10	3.50	1.98
19.....	2.7	2.6	3.25	.....	4.8	4.2	3.22	2.36	3.64	4.20	4.16	1.96
20.....	2.45	2.5	.....	.....	4.3	4.0	3.06	2.30	3.17	4.35	3.38	2.34
21.....	2.4	2.35	.....	.....	3.95	3.8	2.98	2.37	2.84	5.05	2.94	2.64
22.....	2.15	2.2	.....	.....	3.7	3.6	2.92	2.46	2.64	5.10	2.75	3.42
23.....	2.05	2.05	.....	.....	3.55	3.45	2.86	2.58	2.57	4.29	2.95	3.42
24.....	2.05	2.15	.....	.....	3.55	3.35	2.84	2.77	2.50	3.52	3.16	2.94
25.....	2.05	2.0	.....	.....	6.3	3.25	3.06	2.99	2.36	3.10	2.85	2.62
26.....	2.4	1.96	.....	.....	5.4	3.15	3.18	3.13	2.15	2.79	2.69	2.40
27.....	2.7	2.0	.....	.....	4.9	3.6	3.06	4.11	2.07	2.61	2.53	2.33
28.....	2.55	2.0	.....	.....	4.5	3.75	3.56	4.07	1.97	2.44	2.39	2.62
29.....	2.35	2.0	.....	.....	.....	3.75	6.56	3.62	1.87	2.32	2.30	3.02
30.....	2.25	1.99	.....	.....	.....	3.7	6.58	4.56	1.80	2.22	2.81	2.82
31.....	2.2	.....	.....	.....	.....	3.6	.....	6.35	.....	2.12	2.63	.....

"NOTE.—Gage carried away by ice Dec. 20, 1914; no gage readings Dec. 20 to Feb. 8.

"The following discharge measurement was made by B. E. Jones, August 25, 1916: Gage height, 3.53 feet; discharge, 1,530 second-feet."

Daily gage height, in feet, of Gauley River at Belva, W. Va.,
for the year ending Sept. 30, 1916.

(Stephen Elliott, observer).

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	10.31	2.19	3.52	6.39	7.76	4.60	5.51	4.36	3.95	2.68	2.55	2.12
2.....	9.94	2.10	3.40	6.93	8.67	4.67	4.95	4.02	3.53	2.52	2.40	2.02
3.....	7.32	2.05	3.26	6.73	6.85	5.51	4.57	3.82	3.43	2.62	4.45	1.96
4.....	6.12	2.01	3.18	5.62	4.67	5.36	4.21	3.94	4.25	2.82	3.65	1.92
5.....	4.77	2.03	3.09	4.96	4.59	4.80	4.05	4.39	4.05	2.94	4.32	1.91
6.....	4.22	2.00	2.92	4.90	4.79	5.16	3.79	4.36	3.48	2.57	4.84	1.82
7.....	3.80	1.97	2.78	4.86	5.51	9.39	3.67	4.15	3.71	2.31	4.18	1.80
8.....	3.52	1.90	2.47	4.88	5.99	11.40	3.83	4.19	4.45	2.13	4.18	1.72
9.....	3.10	1.87	2.71	4.42	5.72	7.92	4.07	4.04	4.28	2.03	6.58	1.70
10.....	2.95	1.84	2.57	4.42	5.59	6.34	4.27	4.38	4.45	1.97	7.90	1.70
11.....	2.79	1.80	2.47	7.80	5.42	5.41	5.35	4.03	4.34	2.01	5.75	1.90
12.....	2.65	1.85	2.44	10.91	5.03	4.88	6.30	3.78	4.00	2.61	5.35	1.85
13.....	2.55	1.94	2.47	9.06	5.22	4.56	7.33	3.42	3.60	2.51	5.35	1.72
14.....	2.47	2.08	2.71	8.06	5.96	4.65	6.70	3.22	3.20	2.26	5.38	1.90
15.....	2.33	2.90	2.57	6.60	5.18	6.88	5.85	3.03	3.04	2.13	4.68	5.15
16.....	2.24	6.78	2.67	5.54	4.97	6.51	5.05	2.94	4.00	2.13	4.25	5.96
17.....	2.23	5.50	4.84	5.02	4.59	5.64	4.63	2.89	5.14	2.91	5.45	4.45
18.....	2.19	4.76	11.38	4.23	4.31	5.11	4.40	2.95	4.77	4.06	5.40	3.56
19.....	2.23	4.18	10.16	3.60	4.12	4.84	4.12	2.91	4.10	4.09	4.55	3.05
20.....	3.13	5.50	7.14	3.58	4.97	4.61	3.98	2.75	3.77	3.43	4.00	2.70
21.....	3.41	5.13	5.74	4.24	4.27	4.64	3.79	2.65	3.50	3.03	3.88	2.50
22.....	3.13	4.81	4.94	5.12	4.72	5.28	3.79	2.55	3.22	4.29	4.60	2.32
23.....	2.93	4.46	4.27	6.98	4.65	7.99	3.81	2.55	3.20	4.93	5.10	2.22
24.....	2.76	4.02	3.89	6.46	4.75	6.77	3.66	3.04	3.02	3.81	4.32	2.12
25.....	2.61	3.80	3.69	5.48	8.39	6.04	3.56	3.95	3.94	3.99	3.62	2.09
26.....	2.45	3.60	4.44	4.40	8.11	5.31	4.84	3.63	5.84	3.25	3.14	2.04
27.....	2.40	3.48	4.87	4.44	6.68	5.90	5.36	3.65	4.77	2.91	2.78	1.96
28.....	2.39	3.69	4.91	4.21	5.46	9.33	5.38	3.53	3.72	2.73	2.56	1.86
29.....	2.31	3.80	8.18	4.16	5.01	8.72	5.19	3.11	3.18	3.33	2.42	3.68
30.....	2.22	3.62	11.15	5.90	.....	6.75	4.76	3.23	2.89	3.03	2.31	6.10
31.....	2.21	.....	7.97	6.33	.....	6.15	.....	4.07	.....	2.76	2.22	.....

"Gauley River near Summersville, W. Va.

"This station is located at the highway bridge, known as Brocks Bridge, about 2½ miles southeast of Summersville, W. Va. It was established July 6, 1908, to obtain data for use in studying water power, water supply, pollution, flood control, and storage problems.

"Muddlety Creek enters about one-eighth mile above the station. The drainage area above the section is about 686 square miles.

"The gage datum has remained unchanged. The records are reliable and accurate. Sufficient data have not been obtained to enable estimates of the flow to be made."

Discharge measurements of Gauley River near
Summersville, W. Va., in 1908.

Date	Hydrographer	Width Feet	Area of section Sq. Ft.	Gage height Feet	Dis- charge Sec. Ft.
July 6.....	O'Neill and Chapman	202	962	6.99	1,640
July 30.....	W. G. Hoyt.....	202	1,110	7.30	2,060

Daily gage height, in feet, of Gauley River near
Summersville, W. Va., for 1908.

(Observer, William R. Dooley).

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Day	July	Aug.	Sept.	Oct.	Nov.	Dec.
1...	.....	5.88	4.34	3.52	4.94	4.06	16..	5.56	4.72	3.51	3.59	3.76	5.44
2...	.....	5.46	4.16	3.56	4.82	4.09	17..	5.01	4.70	3.46	3.56	3.65	5.57
3...	.....	5.18	4.55	3.57	4.65	4.04	18..	4.92	4.58	3.40	3.55	3.79	6.41
4...	.....	5.50	3.98	3.54	4.45	4.02	19..	5.82	4.48	3.35	3.52	3.90	8.66
5...	.....	4.76	3.92	3.48	4.24	4.02	20..	5.75	4.42	3.32	3.46	4.18	7.58
6...	6.99	5.26	3.92	3.42	4.48	4.09	21..	5.28	4.34	3.29	3.42	4.35	6.50
7...	8.44	6.42	3.88	3.34	4.20	4.45	22..	6.48	4.25	3.24	3.39	4.28	6.17
8...	6.99	5.59	3.86	3.20	3.93	5.46	23..	6.55	4.34	3.20	3.34	4.19	5.90
9...	5.96	6.45	3.82	3.28	3.84	5.65	24..	7.48	4.62	3.18	3.29	4.14	5.72
10...	5.67	7.29	3.80	3.29	3.78	5.48	25..	6.79	4.48	3.18	3.29	4.34	5.89
11...	5.40	6.32	3.78	3.40	3.72	5.78	26..	7.88	4.92	3.21	3.42	4.16	6.52
12...	5.05	5.75	3.72	3.88	3.66	7.41	27..	9.60	5.82	3.25	3.88	4.14	6.12
13...	4.91	5.39	3.66	3.82	3.88	7.38	28..	10.30	5.18	3.28	3.98	4.11	5.79
14...	4.80	5.04	3.58	3.76	3.82	6.38	29..	8.72	4.81	3.34	3.92	4.05	5.80
15...	5.76	4.84	3.56	3.68	3.76	5.76	30..	7.34	4.66	3.30	4.42	4.01	6.19
							31..	6.34	4.56	.....	5.25	.....	8.12

Discharge measurements of Gauley River near
Summersville, W. Va., in 1909.

Date	Hydrographer	Width Feet	Area of section Sq. Ft.	Gage height Feet	Dis- charge Sec. Ft.
April 6.....	H. J. Jackson.....	231	1,470	9.04	4,120
April 7.....	H. J. Jackson.....	225	1,360	8.55	3,380
April 8.....	H. J. Jackson.....	205	1,120	7.63	2,260
April 9.....	H. J. Jackson.....	203	1,020	7.06	1,730
April 10.....	H. J. Jackson.....	202	938	6.71	1,440
April 11.....	H. J. Jackson.....	200	860	6.27	1,120
April 12.....	H. J. Jackson.....	200	809	6.11	990

Daily gage height, in feet, of Gauley River near
Summersville, W. Va., for 1909.

(Adam Chapman and Mrs. Icie Hypes, observers).

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	7.63	5.96	7.24	7.23	9.58	5.28	7.80	4.77	3.65	4.20	5.18	5.23
2.....	6.70	6.01	6.96	7.50	9.72	5.12	8.60	4.80	3.60	4.12	5.05	5.12
3.....	6.34	5.99	7.00	7.22	8.68	5.12	6.98	4.63	3.57	4.00	5.23	5.10
4.....	6.17	5.86	7.70	7.52	7.92	5.21	6.15	4.36	3.61	3.94	5.14	5.10
5.....	7.10	6.02	7.54	8.26	7.42	5.60	5.63	4.20	4.42	3.84	4.96	5.02
6.....	6.18	7.10	8.03	8.80	7.00	5.86	6.06	4.04	4.67	3.83	4.89	4.88
7.....	8.50	8.30	8.05	8.40	6.60	5.64	7.22	3.97	4.35	3.82	4.82	4.89
8.....	7.43	7.35	9.66	7.60	7.19	5.28	6.58	3.84	4.16	3.79	4.85	5.15
9.....	6.84	7.02	10.03	7.03	7.28	5.58	5.96	3.75	3.99	3.66	6.00	5.26
10.....	6.48	9.62	10.72	6.69	8.22	6.58	5.54	3.99	4.33	3.64	8.46	5.10
11.....	6.26	9.25	9.12	6.30	9.31	7.48	5.22	3.99	5.09	6.55	8.12	5.00
12.....	6.40	8.24	8.14	6.18	8.28	7.02	4.96	3.86	5.10	8.02	7.22	5.22
13.....	6.38	7.70	8.45	6.04	7.48	6.26	5.09	3.77	4.62	5.98	6.56	5.32
14.....	6.22	8.38	8.78	13.18	6.97	6.07	5.55	3.75	4.36	5.26	6.20	9.58
15.....	10.82	9.15	8.42	10.14	6.53	6.32	5.46	3.91	4.12	5.02	5.91	7.72
16.....	10.68	10.76	7.74	8.66	6.18	7.55	5.32	5.30	5.96	5.16	5.64	6.80
17.....	9.75	10.60	7.28	7.72	5.88	6.69	5.14	5.55	6.32	5.14	5.52	6.33
18.....	8.61	8.95	7.22	7.14	5.62	7.55	4.82	5.30	5.50	5.04	5.43	6.09
19.....	7.65	8.06	6.52	6.72	5.40	7.19	4.64	4.98	4.98	5.20	.....	5.46
20.....	7.21	8.88	6.33	6.79	5.30	6.40	4.51	4.71	4.70	5.62	.....	6.26
21.....	7.60	8.75	6.65	7.96	5.28	5.95	4.40	4.52	4.46	5.38	.....	5.87
22.....	6.88	9.22	8.55	10.06	6.30	5.80	4.26	4.22	4.28	5.26	.....	5.64
23.....	6.94	8.73	7.85	10.90	5.82	5.76	4.48	4.01	4.13	5.22	5.50	5.71
24.....	7.19	8.45	7.28	10.20	5.45	6.28	5.05	3.92	4.70	7.08	5.75	5.62
25.....	6.94	9.50	8.28	8.80	5.26	6.46	5.45	3.73	5.82	7.10	5.65	5.68
26.....	6.74	8.52	9.55	8.00	5.76	5.92	5.00	3.68	5.19	6.59	5.46	5.64
27.....	6.45	8.18	8.82	7.46	6.91	5.52	4.64	3.72	4.80	6.30	5.28	5.53
28.....	6.18	7.72	9.78	8.24	6.48	6.02	4.44	3.77	4.58	6.06	5.19	5.57
29.....	6.10	.....	9.65	8.14	6.22	5.80	4.62	3.70	4.37	5.77	5.19	5.60
30.....	6.48	.....	8.52	7.97	5.86	7.16	4.60	3.68	4.29	5.48	5.24	5.34
31.....	5.94	.....	7.74	.....	5.54	.....	4.68	3.66	.....	5.34	.....	5.30

"NOTE.—Ice conditions December 19 to 31."

Discharge measurements of Gauley River near
Summersville, W. Va., in 1910.

Date	Hydrographer	Width Feet	Area of section Sq. Ft.	Gage height Feet	Dis- charge Sec. Ft.
March 25.....	C. T. Bailey.....	200	715	5.68	702
October 14.....	C. T. Bailey.....	182	545	4.88	337

Daily gage height, in feet, of Gauley River near
Summersville, W. Va., for 1910.

(J. W. Dermody, observer).

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	5.38	6.00	10.86	.....	5.95	5.53	4.83	4.47	3.41	5.15	5.15	6.35
2.....	5.60	5.90	9.72	.....	5.70	6.28	4.83	4.37	4.26	5.35	5.30	5.70
3.....	11.32	6.32	8.90	.....	5.50	6.33	5.30	3.93	5.81	5.10	5.55	5.95
4.....	11.10	7.00	8.20	.....	5.30	5.93	5.48	4.32	6.66	4.35	5.55	5.30
5.....	9.01	6.74	7.66	.....	5.38	6.33	7.72	3.37	6.16	4.30	5.45	5.85
6.....	8.20	6.63	7.50	5.10	5.10	10.58	6.62	4.32	6.96	4.60	5.25	6.40
7.....	12.41	5.60	7.42	5.20	4.80	8.98	7.07	3.52	5.96	4.20	5.15	6.30
8.....	10.31	5.82	6.98	5.46	5.10	7.48	8.42	3.61	5.21	4.75	5.05	6.00
9.....	5.60	5.90	9.72	.....	5.70	6.28	4.83	4.37	4.26	5.35	5.30	5.70
10.....	7.47	6.65	6.28	5.15	7.00	7.23	6.32	3.61	5.46	5.75	5.00	5.80
11.....	6.45	6.88	6.12	4.95	6.14	7.88	5.97	3.76	4.90	5.45	4.80	5.20
12.....	6.38	7.00	6.00	5.30	9.18	8.03	5.07	3.36	5.17	5.00	4.75	4.95
13.....	6.29	6.94	6.00	6.20	9.86	8.93	8.12	3.31	4.75	5.05	4.25	5.25
14.....	7.34	6.75	5.92	6.15	8.65	8.78	8.27	3.51	7.65	4.85	4.55	5.15
15.....	7.10	6.47	5.84	6.50	6.75	8.68	7.52	3.86	5.75	4.70	4.70	5.35
16.....	6.76	6.88	5.79	5.75	6.50	10.68	6.42	3.81	5.60	4.35	4.75	5.50
17.....	6.53	9.68	5.74	6.00	5.90	10.98	6.07	3.66	5.30	4.45	4.65	5.35
18.....	7.84	11.39	5.60	6.25	5.95	9.48	6.12	3.26	5.00	4.45	4.50	5.80
19.....	11.22	9.64	5.40	6.65	6.55	8.68	5.77	3.16	4.70	4.30	4.50	6.15
20.....	9.24	8.46	5.33	6.85	6.05	8.53	5.57	3.61	4.75	4.20	4.25	7.05
21.....	9.08	7.66	5.36	7.80	6.26	8.03	5.17	3.66	4.70	4.25	4.50	6.95
22.....	9.80	8.28	5.80	8.65	6.40	7.88	4.62	3.11	4.50	4.40	4.40	6.75
23.....	8.48	9.06	5.50	9.48	6.10	6.98	4.47	3.36	4.25	5.40	4.45	6.55
24.....	7.68	8.19	5.48	9.54	6.21	5.98	4.62	4.01	4.35	5.15	4.55	7.25
25.....	7.06	7.42	5.62	8.80	6.55	5.98	4.32	4.06	6.15	4.85	4.55	7.88
26.....	6.70	6.72	5.55	8.10	6.20	5.48	5.12	4.36	7.00	4.40	5.54	7.10
27.....	7.20	6.67	5.46	7.45	6.30	5.68	5.77	3.61	6.40	4.50	6.05	6.55
28.....	7.56	7.78	5.34	7.15	6.05	6.58	4.72	3.31	6.25	5.15	6.70	6.30
29.....	7.12	.....	4.80	6.80	5.60	6.53	5.17	3.06	6.10	5.80	8.50	7.80
30.....	6.68	.....	4.70	6.50	5.45	5.93	4.67	3.71	5.65	5.25	7.35	14.00
31.....	6.46	.....	.....	.....	5.60	.....	5.17	3.26	.....	5.05	.....	10.50

“NOTE.—No ice reported by observer; relation of gage height to discharge probably not affected by ice.

“The following discharge measurement of Gauley River near Summersville, W. Va., was made by C. T. Bailey:

“July 28, 1911: Gage height, 4.10 feet; discharge, 114 second-feet.”

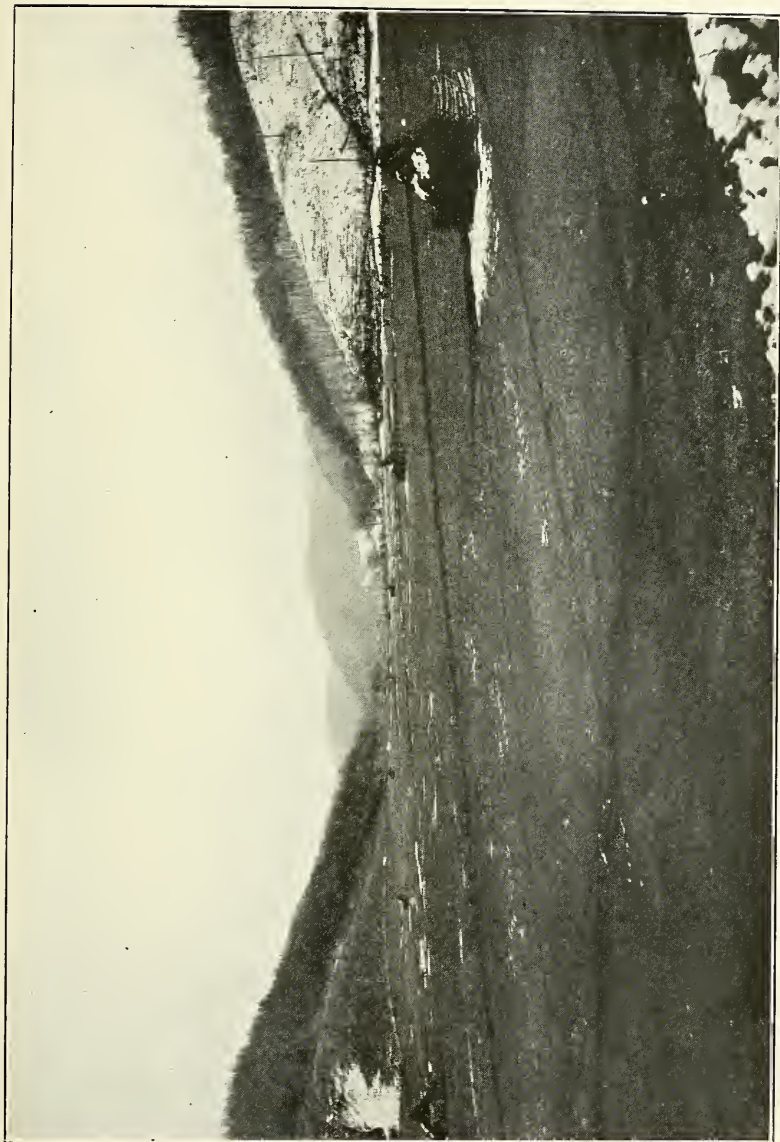


PLATE III.—Looking east up McMillion Creek from point 3 miles above mouth, showing typical wide valley of creek; Topography of Allegheny Series and Kanahwa Group.

Photo by E. E. Harris.

Daily gage height, in feet, of Gauley River near
Summersville, W. Va., for 1911.

(J. W. Dermody, observer).

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	9.60	9.30	6.10	6.95	5.70	5.40	4.15	3.65	5.75	5.15	4.95	6.95
2.....	13.00	9.30	5.45	6.75	6.10	5.10	3.70	3.65	5.25	6.6	4.9	6.5
3.....	13.50	8.60	5.30	6.90	5.75	4.55	4.00	2.65	4.55	8.9	4.85	5.95
4.....	10.50	8.15	5.75	8.95	5.85	4.15	4.30	3.30	3.90	7.1	4.65	5.85
5.....	8.90	7.45	5.15	10.85	5.50	4.10	4.00	3.50	4.65	6.5	4.4	5.5
6.....	7.35	7.15	8.65	10.05	5.50	5.25	3.50	3.90	5.00	6.15	5.1	5.3
7.....	7.10	6.60	10.40	8.70	4.85	4.95	3.90	4.10	5.00	5.45	9.95	5.3
8.....	6.70	6.20	9.35	8.45	4.75	4.65	5.30	4.65	4.30	9.8	8.35	5.1
9.....	6.15	7.10	8.05	9.60	4.80	4.35	5.15	4.45	4.90	8.1	7.55	5.45
10.....	5.65	6.85	8.20	9.20	4.70	4.10	3.90	4.10	5.80	7.2	6.9	5.35
11.....	5.85	6.72	8.30	8.10	4.80	3.55	4.10	3.75	5.75	7.65	6.4	5.3
12.....	5.75	6.48	7.75	7.35	4.75	4.25	5.05	3.90	7.15	8.0	5.9	5.75
13.....	12.60	6.20	8.40	7.35	4.55	5.35	5.05	3.60	6.15	7.55	7.1	5.6
14.....	12.10	6.00	8.50	7.30	4.75	4.95	4.55	3.25	5.95	6.8	7.05	5.55
15.....	11.20	5.85	8.00	10.10	4.65	4.40	4.40	3.95	5.30	7.1	6.75	5.15
16.....	10.70	5.30	7.20	8.85	4.60	4.55	3.90	3.70	9.65	9.3	6.45	6.15
17.....	9.10	5.05	7.05	7.50	4.40	3.80	3.90	4.60	7.70	8.15	6.1	6.8
18.....	7.75	4.95	7.05	7.25	4.30	3.95	3.85	4.15	6.70	13.0	6.7	6.95
19.....	7.20	5.35	6.90	6.70	4.35	4.80	3.95	3.80	6.05	9.85	8.45	6.5
20.....	6.75	5.75	10.00	8.80	4.25	4.90	3.65	3.70	5.65	8.85	7.15	6.25
21.....	6.70	5.70	8.80	9.35	4.10	4.30	3.35	4.05	5.35	7.55	7.0	5.95
22.....	9.80	5.12	8.00	9.00	3.75	4.35	4.15	3.75	5.30	6.6	6.45	5.75
23.....	9.20	5.50	8.10	9.25	4.15	4.05	3.45	3.75	5.40	7.2	6.05	7.15
24.....	7.95	5.35	7.60	8.75	4.45	4.15	3.65	3.55	4.95	6.8	5.8	8.0
25.....	7.25	5.50	7.25	7.90	4.80	3.25	3.95	3.25	4.75	6.3	6.1	7.65
26.....	7.90	5.15	6.80	7.40	4.35	4.20	4.05	3.55	4.60	6.05	6.65	7.3
27.....	10.85	7.30	7.20	7.00	4.35	4.55	4.10	4.05	4.65	5.8	6.35	7.75
28.....	10.20	5.70	7.20	6.40	4.10	5.55	3.50	4.20	4.50	5.6	6.6	7.55
29.....	9.45	.....	6.49	6.45	4.05	5.45	3.60	4.03	4.75	5.5	7.25	7.35
30.....	16.65	.....	7.00	6.05	3.90	4.90	4.20	4.00	5.15	5.3	7.3	7.15
31.....	10.85	.....	6.90	.....	4.35	.....	3.70	5.05	.....	5.3	.....	7.55

“NOTE.—Observer made no report concerning ice. Relation of gage height to discharge probably not affected by ice during 1911.

“The following discharge measurement was made by C. T. Bailey, of the Gauley River near Summersville, W. Va.:

“March 29, 1912: Gage height, 11.96 feet; discharge, 9,460 second-feet.”

Daily gage height, in feet, of Gauley River near
Summersville, W. Va., for 1912.

(Mrs. Sula Gawthrop, observer).

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	8.4	7.7	7.4	8.4	7.4	4.02	4.13	7.4	6.3	5.4	4.95	4.6
2.....	7.9	7.2	6.4	8.9	6.9	4.0	3.68	5.65	5.2	5.7	4.42	4.65
3.....	7.4	6.0	7.6	10.1	6.6	3.06	4.6	5.5	4.8	5.7	5.05	5.9
4.....	7.2	6.5	6.2	9.1	6.1	3.44	4.00	5.6	6.2	5.6	5.2	6.2
5.....	6.6	7.1	7.2	8.3	6.5	3.72	7.0	4.95	5.9	4.46	4.55	7.2
6.....	6.8	6.8	8.0	7.6	6.1	3.18	6.3	5.45	4.6	4.36	3.87	7.8
7.....	6.7	6.4	5.4	7.2	7.5	4.15	5.0	4.4	6.4	4.33	7.3	8.5
8.....	6.8	6.4	5.6	8.1	7.9	3.60	4.95	5.95	4.6	4.5	11.4	7.4
9.....	7.0	6.3	7.4	7.4	8.0	3.88	4.06	4.9	4.33	4.08	9.2	6.8
10.....	7.0	6.2	6.7	7.1	7.2	2.31	6.2	4.23	5.2	3.83	7.8	6.4
11.....	7.1	6.0	7.6	6.6	6.7	3.74	4.75	5.35	4.6	4.40	7.3	6.2
12.....	7.2	6.1	9.7	6.3	13.6	3.02	6.8	5.7	3.30	4.30	6.3	5.65
13.....	7.0	6.0	8.6	6.2	11.8	2.94	5.2	6.3	3.60	3.68	5.5	5.2
14.....	6.6	5.8	9.0	6.6	9.5	2.95	5.1	5.75	4.13	4.02	5.75	4.8
15.....	6.6	5.7	11.8	5.5	8.8	2.62	5.65	5.7	3.26	4.08	5.5	4.37
16.....	6.8	5.7	13.2	6.5	11.5	2.87	7.4	5.15	3.93	3.81	5.4	4.02
17.....	6.8	5.55	10.2	7.6	11.2	3.44	6.2	5.55	4.5	3.53	4.95	4.7
18.....	6.6	5.45	8.8	7.2	9.7	4.30	7.8	4.55	3.60	3.99	5.2	5.2
19.....	8.4	5.55	8.6	7.4	8.5	6.6	9.4	4.95	4.8	4.03	5.05	5.05
20.....	9.3	6.0	9.8	6.6	7.8	6.8	7.6	6.7	4.9	5.75	4.85	4.8
21.....	7.9	7.2	9.8	6.2	7.1	5.6	6.7	6.0	4.20	4.75	5.05	5.0
22.....	7.3	10.1	10.0	6.3	6.4	5.4	7.6	6.0	4.10	4.5	5.05	5.05
23.....	6.8	8.5	8.6	6.7	6.1	5.0	6.5	6.0	4.8	5.0	4.47	5.0
24.....	6.4	7.8	10.6	6.5	5.6	4.12	6.0	5.2	7.9	7.2	4.95	5.2
25.....	6.1	6.9	11.3	6.5	5.55	6.4	12.8	4.8	7.1	6.7	4.85	5.1
26.....	5.7	9.2	9.2	6.2	5.0	5.4	10.6	5.45	5.9	6.1	4.55	5.3
27.....	6.4	13.0	8.2	6.0	4.9	6.0	7.9	5.75	6.1	5.85	4.36	5.5
28.....	6.2	10.5	6.8	6.7	4.85	7.3	5.3	4.8	6.0	5.25	4.5	5.7
29.....	6.6	8.4	10.2	6.5	4.75	8.3	5.65	7.9	5.95	5.3	4.25	5.6
30.....	10.0	.....	11.1	7.0	4.7	4.65	5.8	8.5	5.3	4.75	4.47	6.9
31.....	9.4	.....	9.7	.....	4.38	.....	6.2	6.6	.....	5.0	.....	11.0

“NOTE.—No report by observer relative to ice is available. Relation of gage heights to discharge probably affected by ice during parts of January and February.

“No discharge measurements were made for Gauley River near Summersville, W. Va., during the year ending September 30, 1913.”

Daily gage height, in feet, of Gauley River near Summersville,
W. Va., for the year ending Sept. 30, 1913.

(J. W. Dermody, observer).

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	5.4	4.95	4.6	9.0	7.5	7.9	7.3	7.7	9.2	5.55	4.11	4.35
2.....	5.7	4.42	4.65	7.7	7.3	7.2	6.9	7.1	8.1	5.35	4.65	4.15
3.....	5.7	5.05	5.9	7.4	7.7	6.8	6.6	6.8	7.2	4.9	4.85	3.95
4.....	5.6	5.2	6.2	8.2	10.5	6.3	6.4	6.5	6.3	6.7	4.6	4.08
5.....	4.46	4.55	7.2	7.4	9.4	6.4	5.85	5.9	6.4	6.0	3.55	3.83
6.....	4.36	3.87	7.8	9.3	7.8	6.2	5.65	5.8	5.95	9.3	4.08	3.53
7.....	4.23	7.3	8.5	12.4	7.0	6.1	5.55	5.7	5.9	7.8	3.91	3.88
8.....	4.5	11.4	7.4	13.9	6.0	6.2	6.1	5.5	8.2	6.2	2.93	5.5
9.....	4.08	9.2	6.8	13.3	6.1	5.8	5.75	5.35	8.4	5.8	3.83	5.2
10.....	3.83	7.8	6.4	9.7	5.7	5.75	5.55	5.25	7.5	7.0	3.58	4.9
11.....	4.40	7.3	6.2	8.7	6.4	8.4	6.4	5.05	6.8	7.5	4.11	4.41
12.....	4.30	6.3	5.65	8.3	7.7	9.1	6.5	5.0	6.3	6.4	3.93	4.35
13.....	3.68	5.5	5.2	9.5	8.1	7.8	7.0	4.9	5.85	6.1	5.55	4.55
14.....	4.02	5.75	4.8	8.4	7.5	10.3	7.3	4.9	5.6	5.8	6.2	4.04
15.....	4.08	5.5	4.37	7.5	6.6	10.0	12.0	4.8	5.3	5.75	5.5	4.00
16.....	3.81	5.4	4.02	7.1	6.3	9.5	9.9	5.05	5.1	6.7	4.48	3.97
17.....	3.53	4.95	4.7	6.8	6.0	8.8	9.1	6.1	5.2	6.0	4.41	4.10
18.....	3.99	5.2	5.2	6.5	6.0	7.4	8.2	7.5	4.9	6.0	4.08	4.55
19.....	4.03	5.05	5.05	6.3	6.4	7.2	7.3	6.8	4.7	5.9	4.53	5.0
20.....	5.75	4.85	4.8	6.3	5.9	6.6	7.0	6.3	4.55	7.0	6.4	4.37
21.....	4.75	5.05	5.0	6.7	6.3	6.4	6.8	6.2	4.5	7.4	5.6	6.5
22.....	4.5	5.05	5.05	7.2	6.5	6.2	6.4	6.8	4.65	6.3	4.55	8.2
23.....	5.0	4.47	5.0	7.1	7.1	6.1	6.2	6.8	5.1	6.0	4.85	7.4
24.....	7.2	4.95	5.2	7.8	6.2	6.4	5.95	11.0	5.0	5.75	7.4	7.2
25.....	6.7	4.85	5.1	9.4	6.3	5.85	5.85	9.4	5.1	7.3	6.2	6.5
26.....	6.1	4.55	5.3	8.8	6.1	6.0	5.6	8.1	6.6	6.6	5.75	5.15
27.....	5.85	4.36	5.5	8.3	6.2	10.2	6.5	10.3	6.7	5.75	5.5	4.85
28.....	5.25	4.5	5.7	7.8	6.6	11.5	7.8	12.6	5.9	5.6	5.1	4.27
29.....	5.3	4.25	5.6	7.0	.....	9.4	7.7	9.9	5.4	3.35	4.6	4.40
30.....	4.75	4.47	6.9	6.8	.....	8.3	8.3	8.9	5.25	5.15	4.28	4.5
31.....	5.0	.....	11.0	6.6	.....	7.8	.....	11.3	.....	4.85	4.38	.....

"NOTE.—Observer made no notes concerning ice. Discharge relation probably not materially affected by ice during the year ending Sept. 30, 1913.

"The following discharge measurement of Gauley River near Summersville, W. Va., was made by Peterson and Walters:

"November 19, 1913: Gage height, 8.83 feet; discharge, 3,500 second-feet."

Daily gage height, in feet, of Gauley River near Summersville,
W. Va., for the year ending Sept. 30, 1914.

(J. W. Dermody, observer).

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	4.95	6.2	7.6	6.6	9.9	6.3	9.4	7.0	4.19	3.91	3.73	5.2
2.....	5.05	6.0	10.3	6.4	8.5	5.6	11.6	6.6	4.07	3.88	3.65	4.8
3.....	5.1	5.85	9.2	6.3	7.7	5.85	10.9	6.4	4.07	3.81	3.63	4.75
4.....	7.5	5.65	8.2	6.2	7.3	6.2	9.3	6.2	4.02	3.76	3.55	4.65
5.....	6.2	5.5	7.6	6.2	7.0	6.2	8.3	6.4	4.02	3.91	3.45	4.45
6.....	5.5	5.45	7.0	6.1	7.1	6.1	7.5	9.8	4.11	3.98	3.63	4.30
7.....	5.4	5.3	7.2	6.0	7.9	6.2	7.0	9.0	4.06	3.84	3.65	4.17
8.....	5.05	5.3	8.8	6.0	8.2	6.0	9.5	8.0	3.96	3.74	3.95	4.23
9.....	5.25	7.9	8.1	7.0	7.4	5.85	10.9	7.5	3.88	3.76	4.7	4.30
10.....	7.0	7.7	7.6	8.3	7.0	5.65	9.2	7.0	3.88	3.84	4.8	4.17
11.....	6.1	7.3	7.2	8.2	6.9	6.3	8.1	6.6	3.76	3.91	4.5	4.17
12.....	5.85	7.2	6.8	7.2	6.2	6.2	7.5	6.4	3.76	3.88	4.65	4.25
13.....	5.75	7.7	6.5	6.4	6.2	6.0	7.0	6.1	3.54	3.78	5.7	4.42
14.....	5.5	11.6	6.4	6.6	5.95	6.1	6.7	6.0	3.86	3.86	5.25	4.32
15.....	5.3	14.1	6.0	5.9	5.55	7.2	6.7	5.85	3.76	4.85	4.65	4.19
16.....	5.15	15.4	5.95	6.0	5.85	9.0	11.0	5.6	3.66	5.05	4.85	4.04
17.....	5.1	13.4	5.9	6.2	6.2	10.8	10.5	5.45	3.66	4.9	4.17	3.99
18.....	4.95	10.4	5.9	6.2	5.45	10.6	9.0	5.35	3.64	4.65	4.07	3.86
19.....	5.45	8.7	6.0	6.2	9.9	9.1	8.2	5.2	3.61	4.41	3.90	3.79
20.....	6.8	7.9	5.85	6.7	12.9	8.2	10.4	5.05	3.64	4.24	3.85	3.79
21.....	8.9	7.3	5.8	12.5	9.8	7.2	10.6	4.95	3.58	4.01	3.85	3.74
22.....	8.1	6.7	5.8	10.3	8.4	7.2	9.0	4.8	3.56	3.81	4.8	3.69
23.....	7.6	6.5	5.7	8.7	8.0	6.9	8.1	4.6	3.58	3.76	4.55	3.64
24.....	7.3	6.2	5.7	8.1	7.5	6.9	7.4	4.65	3.61	3.76	4.35	3.74
25.....	13.1	6.0	6.0	11.5	6.7	7.8	7.0	4.6	4.9	3.66	4.7	3.74
26.....	13.5	5.85	8.1	9.9	6.8	10.1	11.0	4.6	5.15	3.70	5.95	3.47
27.....	10.3	5.7	8.1	8.6	6.4	11.8	10.8	4.47	5.0	3.90	6.9	3.84
28.....	8.7	6.4	7.4	8.1	6.4	12.3	9.0	4.37	4.55	4.33	5.9	3.76
29.....	7.7	8.5	7.1	8.4	.....	11.0	8.0	4.22	4.26	4.10	5.85	3.74
30.....	7.1	7.7	7.0	8.6	.....	10.3	7.5	4.07	4.04	4.00	6.0	3.64
31.....	6.5	.....	6.6	10.2	.....	10.8	.....	4.25	.....	3.85	5.65	.....

"NOTE.—Discharge relation probably affected by ice about Jan. 13-19, Feb. 13-19 and Mar. 4-6.

"The following discharge measurement of Gauley River near Summersville, W. Va., was made by Mathers and Morgan:

"November 1, 1914: Gage height, 5.06 feet; discharge, 376 second-feet."

Daily gage height, in feet, of Gauley River near Summersville,
W. Va., for the year ending Sept. 30, 1915.

(Mrs. G. L. Ward, observer).

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	3.64	5.0	5.15	7.8	11.5	6.8	5.95	7.75	8.25	4.83	5.83	5.30
2.....	3.64	4.9	6.2	7.2	15.2	6.5	5.85	7.03	7.22	5.48	5.88	5.02
3.....	3.59	4.7	6.6	6.2	13.5	6.5	5.85	6.80	8.07	5.35	6.50	4.95
4.....	3.50	4.7	6.4	6.2	10.6	6.1	5.88	6.92	8.90	5.12	6.42	5.73
5.....	3.64	4.6	11.2	5.9	9.6	6.4	5.65	6.47	8.00	5.85	5.75	7.90
6.....	3.69	4.5	9.1	6.2	9.2	7.0	5.75	6.25	7.10	6.75	5.27	7.13
7.....	3.92	4.40	7.6	15.9	8.6	7.0	7.45	6.07	6.70	5.73	5.15	6.60
8.....	3.89	4.40	7.1	10.9	7.8	6.8	8.05	6.0	6.43	5.62	4.95	6.10
9.....	3.84	4.45	6.8	9.1	7.3	6.4	7.75	5.78	6.08	6.40	4.88	5.67
10.....	3.84	4.40	6.8	7.8	6.7	6.4	8.00	5.50	5.70	6.03	4.85	5.35
11.....	4.04	4.40	6.6	7.2	6.5	6.5	7.88	5.38	5.38	5.73	4.83	5.15
12.....	4.06	4.30	6.3	9.2	6.6	6.5	7.73	5.27	5.40	5.92	4.95	4.97
13.....	3.99	4.30	6.1	8.7	6.5	6.2	7.28	5.40	5.33	5.55	6.15	4.83
14.....	4.04	4.20	6.0	7.6	7.4	6.2	6.92	5.28	7.40	5.32	5.72	4.67
15.....	4.39	4.22	5.8	8.4	9.8	6.2	6.53	5.07	8.77	5.07	5.50	5.35
16.....	6.0	4.90	5.5	8.8	10.1	6.42	6.40	5.05	7.55	5.15	5.65	4.83
17.....	6.5	6.1	5.9	9.6	8.7	6.57	6.25	4.90	6.78	6.98	5.40	4.60
18.....	5.65	5.6	6.0	12.8	7.9	6.42	6.15	4.90	6.35	9.53	8.05	4.45
19.....	5.35	5.3	6.2	13.2	7.3	6.45	5.95	4.75	6.32	7.00	6.95	5.20
20.....	5.1	5.1	10.2	10.4	6.8	6.20	5.75	4.80	5.67	7.80	6.10	5.58
21.....	4.8	4.8	9.2	8.8	6.5	6.08	5.78	5.00	5.40	8.80	5.80	5.85
22.....	4.6	4.8	10.6	7.7	6.3	5.93	5.60	5.07	5.35	8.18	6.10	7.23
23.....	4.6	4.7	8.7	7.3	6.2	5.92	5.45	5.32	5.37	6.97	6.50	6.10
24.....	4.6	4.48	7.5	8.2	7.5	5.68	5.60	5.92	5.12	6.40	6.07	5.57
25.....	5.2	4.42	7.0	8.1	9.1	5.57	5.63	5.73	4.80	5.85	5.85	5.32
26.....	5.75	4.6	6.2	7.8	8.0	5.95	5.55	6.00	4.60	5.45	5.53	5.05
27.....	5.3	4.6	6.0	7.4	7.3	6.33	5.35	7.23	4.58	5.28	5.30	5.13
28.....	5.2	4.6	6.3	6.8	7.0	6.45	5.85	6.70	4.35	5.00	5.15	5.72
29.....	5.0	4.6	6.6	6.4	.....	6.48	9.40	6.30	4.28	4.88	5.95	5.57
30.....	4.9	4.48	9.9	6.1	.....	6.25	8.60	8.63	4.27	4.80	5.88	5.45
31.....	5.0	.....	9.2	6.7	.....	6.12	.....	9.25	.....	5.85	5.50	.....

"NOTE.—Ice on river Dec. 15-18; slush ice jammed at gage Dec. 27 and 28."

Discharge measurements of Gauley River near Summersville,
W. Va., during the year ending Sept. 30, 1916.

(Made by B. E. Jones).

Date	Gage height Feet	Dis-charge Sec. Ft.
August 22.....	8.38	2,710
August 23.....	7.55	1,920
August 23.....	7.08	1,560

Daily gage height, in feet, of Gauley River near Summersville,
W. Va., for the year ending Sept. 30, 1916.

(Mrs. G. L. Ward, observer).

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	13.75	4.83	6.25	8.60	10.30	6.73	8.05	7.05	6.55	5.28	4.85	4.40
2.....	12.45	4.80	6.20	10.73	10.07	7.10	7.50	6.65	6.15	5.50	6.85	4.38
3.....	9.73	4.73	6.00	9.75	8.95	7.75	7.23	6.50	6.65	5.45	6.10	4.34
4.....	8.27	4.60	5.80	8.55	7.77	7.20	7.00	7.00	7.75	6.33	6.25	4.28
5.....	7.45	4.55	5.65	7.60	7.40	7.00	6.58	7.35	6.95	5.52	6.90	4.18
6.....	7.05	4.57	5.55	7.60	7.15	7.43	6.45	7.05	7.30	5.18	6.42	4.05
7.....	6.30	4.57	5.35	7.70	8.80	12.27	6.15	6.85	7.10	4.90	6.55	4.10
8.....	6.13	4.55	5.45	7.20	8.37	11.80	5.85	6.80	7.27	4.68	7.50	4.10
9.....	5.83	4.53	5.43	6.73	8.00	9.65	6.30	7.33	7.30	4.65	11.07	4.40
10.....	5.70	4.45	5.33	7.50	7.80	8.50	6.30	7.25	7.12	5.15	10.10	4.52
11.....	5.47	4.45	5.27	11.05	7.50	7.80	7.60	6.83	6.95	5.50	7.95	4.25
12.....	5.35	4.50	5.37	12.65	7.37	7.10	8.95	6.42	6.40	5.33	8.75	4.08
13.....	5.20	4.70	5.40	11.05	8.35	7.05	9.70	6.10	6.07	4.85	7.93	3.95
14.....	5.07	4.95	5.33	10.15	8.75	8.15	8.75	5.93	5.80	4.80	8.60	4.25
15.....	4.98	8.37	5.33	8.70	7.75	10.70	8.18	5.55	5.83	5.10	7.38	11.18
16.....	4.87	9.40	5.80	7.67	7.35	9.30	7.47	5.45	7.35	4.65	7.20	8.45
17.....	4.77	8.00	8.97	7.05	7.10	8.43	7.20	5.55	8.35	7.40	8.75	6.80
18.....	4.73	7.15	14.90	6.45	6.83	7.90	7.25	5.70	7.15	6.90	7.38	6.10
19.....	5.77	7.45	11.55	6.23	6.65	7.70	6.90	5.50	6.70	6.30	6.75	5.52
20.....	5.30	6.10	7.55	7.27	9.13	8.17	8.60	6.05	8.80	5.85	5.32	4.48
21.....	6.45	7.90	8.23	7.20	7.10	7.53	6.50	5.20	6.18	5.80	6.10	5.02
22.....	6.07	7.55	7.40	7.50	7.15	8.30	6.65	5.05	6.10	9.40	8.26	4.90
23.....	5.80	7.10	6.90	10.05	7.40	11.13	6.63	5.27	5.82	7.15	7.39	4.75
24.....	5.63	6.77	6.60	8.73	8.29	9.35	6.40	6.95	5.60	7.80	6.40	4.65
25.....	5.50	6.40	6.33	7.90	10.35	8.48	6.48	6.30	8.38	6.50	5.75	4.58
26.....	5.30	6.10	7.55	7.37	9.13	8.17	8.60	6.05	8.80	5.85	5.32	4.18
27.....	5.23	6.25	7.27	7.10	8.30	8.65	8.52	6.52	7.20	5.65	5.19	4.35
28.....	5.15	6.97	7.67	6.97	7.75	10.00	8.23	5.93	6.30	5.50	4.98	4.18
29.....	5.07	6.45	12.40	6.90	7.23	10.40	7.90	5.70	5.93	5.87	4.85	8.40
30.....	5.00	6.50	11.93	9.48	.....	9.25	7.35	6.15	5.38	5.32	4.68	8.75
31.....	4.87	.....	9.70	8.85	.....	8.60	.....	7.10	.....	5.07	4.55	.....

Twentymile Creek—Twentymile Creek rises at the eastern edge of Summersville District, Nicholas, one mile southwest of Muddlety Post-office, the elevation of its source being 2125 feet above sea-level. From this point its course is generally southwestward, through Summersville, Grant, and Jefferson Districts, to the Fayette Line at Belva, where it empties into Gauley River at an elevation of 675 feet, its total length being 26.8 miles and its total fall 1450 feet. Most of its course is through cut-over woodland, but near its mouth and on Bells Creek there is a small amount of cleared farm land. The area of its drainage basin is 105.25 square miles. Its principal

tributaries, in ascending order, are Bells Creek, Rockcamp Fork, Ash Fork, Robinson Fork, and Rader Fork.

Bells Creek rises in Cabin Creek District, Kanawha County, two miles southwest of Pond Gap Post-office, the elevation of its source being 1550 feet. From this point its course is generally southeastward to a point about one-half mile north of Belva, where it empties into Twentymile Creek at an elevation of 695 feet, its total length being 7.6 miles and its total fall 855 feet. The area of its drainage basin is 21.71 square miles, a considerable proportion of which is still covered with virgin or cut-over woodland. Its principal tributary is Open Fork, which rises in Clay County and empties into Bells Creek at Dixie.

Rockcamp Fork rises in Clay County about one mile north of Greendale, flows southward and empties into Twentymile Creek at Vaughan, its length being 3.6 miles and the area of its drainage basin 5.44 square miles.

Ash Fork rises in the edge of Clay County, flows southward and empties into Twentymile Creek two miles above Vaughan, its length being 2.7 miles and the area of its drainage basin 2.45 square miles.

Robinson Fork rises in the eastern edge of Grant District near the Lone Star School, flows westward, and empties into Twentymile Creek just east of the Grant-Jefferson District Line, its length being 3.5 miles and the area of its drainage basin 4.77 square miles.

Rader Fork rises just north of the Lone Star School, flows northward, and empties into Twentymile Creek at the Grant-Summersville District Line, its length being 2.4 miles, and the area of its drainage basin, which is fan-shaped, being 3.22 square miles.

Little Elk Creek.—Little Elk Creek rises in Jefferson District, $2\frac{1}{2}$ miles northwest of Lockwood, the elevation of its source being 1600 feet. From this point it flows southwestward to Swiss where it empties into Gauley River at an elevation of 695 feet, its total length being 3.5 miles and its total fall 905 feet. Its course is through cut-over woodland, the area of its drainage basin being 4.86 square miles.

Laurel Creek.—Laurel Creek rises in Jefferson District.

about two miles southwest of Lockwood, the elevation of its source being 1750 feet, flows westward and empties into Gauley 1.1 miles above Swiss, at an elevation of 710 feet, its total length being 3.3 miles and its total fall 1040 feet. Its course is mostly through cut-over woodland, the area of its drainage basin being 4.35 square miles. Left Fork, its principal tributary, is almost as large as the parent stream.

Peters Creek.—Peters Creek rises just north of Summersville at an elevation of 1900 feet, flows generally westward to Lockwood where it veers southward and empties into Gauley 1.3 miles northwest of Albion, at an elevation of 900 feet, its total length being 17.5 miles and its total fall 1000 feet. The area of its drainage basin, a considerable portion of which is farming land and most of the remainder cut-over woodland, is 52.24 square miles. Its principal tributaries, in ascending order, are Otter Creek, Line Creek, Laurel Creek, Jerry Fork, Jones Branch, Whitewater Branch, Buck Garden Creek, Rockcamp Branch, and McClung Branch.

Laurel Creek, its main tributary on the south, rises at an elevation of 1550 feet, just west of Keslers Crosslanes, flows northwestward and empties into Peters Creek, just below Drennen, at an elevation of 1125 feet, its total length being 3.3 miles and its total fall 425 feet. Its course is mostly through a farming community, with some cut-over woodland, the area of its drainage basin being 4.35 square miles.

Buck Garden Creek, the principal tributary of Peters Creek on the north, rises in eastern Summersville District at an elevation of 2150 feet, flows southwestward and empties into Peters Creek just above Gilboa, at an elevation of 1309 feet, its total length being 5.2 miles and its total fall 850 feet. Its course is partly through woodland and partly through a farming community, the area of its drainage basin including Hutchinson Branch which empties a fraction of a mile above the mouth of the parent stream, being 7.31 square miles.

Meadow Creek.—Meadow Creek rises in the western edge of Summersville District, one mile northwest of Gad, at an elevation 1750 feet, flows southwestward, and empties into Gauley River two miles below Carnifex Ferry, at an eleva-

tion of 1110 feet, its total length being 5.8 miles and its total fall 640 feet. Its upper course, which is nearly base-levelled, is through a farming community, but in the lower mile and one-half it flows through woodland, this portion having a much more rapid descent. The area of its drainage basin is 7.73 square miles.

Meadow River.

Meadow River, which is a major tributary of Gauley on the south, rises at the Keeney Knob in eastern Summers County, at an elevation of 3945 feet, flows northward into Greenbrier and thence northwestward, partly along the Fayette-Greenbrier Line to the common corner of those counties with Nicholas, and thence with the Fayette-Nicholas Line by the same general course to Carnifex Ferry where it empties into Gauley at an elevation of 1182 feet, its total length being 50.6 miles and its total fall 2763 feet. Its elevation at Nallen, where it first touches Nicholas County, is 1865 feet, making a fall of 683 feet through the 11.4 miles of its length along the Nicholas Line. The total area of its drainage basin is 371.25 square miles of which 41.91 square miles or 11.3 per cent., are in Nicholas County. A considerable portion of its course is through virgin or cut-over woodland, there being farming communities on the high plateaus, some distance from its main channel, and flat lands in Greenbrier County near its source. Throughout a considerable portion of its lower course it is a rough, turbulent stream, littered with large boulders fallen from the great sandstone cliffs that line the valley. Its principal tributaries entering from Nicholas County are Anglins Creek and Miller Creek. On the Fayette side it receives Dogwood Creek, Brackens Creek, and Laurel Creek. From Greenbrier it receives Burdette Creek, Meadow Creek, Sewell Creek, Laurel Creek, Miller Creek, Big Clear Creek, Little Clear Creek, Otter Creek, and Buffalo Fork.

The following discharge and gaging records of Meadow River are available, being taken from the various Water-Supply Papers of the U. S. Geological Survey previously quoted under the description of Gauley River:

"Meadow River near Russellville, W. Va.

"This station is located at Bays Ferry, about 3 miles below Russellville, W. Va. It was established July 17, 1908, to obtain data for use in studying water power, flood control, and storage problems.

"Youngs Creek enters about one-fourth mile above the section. The drainage area above the section is about 297 square miles.

"This is a cable and boat station. Low-water measurements are made by wading.

"The datum of the gage has remained unchanged. The records are reliable and accurate. Sufficient data have not been obtained to enable estimates of the flow to be made."

Discharge measurements of Meadow River near
Russellville, W. Va., in 1908.

Date	Hydrographer	Width Feet	Area of section Sq. Ft.	Gage height Feet	Dis- charge Sec. Ft.
July 18.....	O'Neill and Chapman.	106	393	4.07	154
August 7 ^a	W. G. Hoyt.....	95	114	3.75	68

^aWading measurement.

Daily gage height, in feet, of Meadow River near
Russellville, W. Va., for 1908.

(Observer, Jacob R. Bays).

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Day	July	Aug.	Sept.	Oct.	Nov.	Dec.
1...	4.28	3.38	2.91	3.94	3.38	16..	.....	3.70	2.98	3.27	3.19	4.84
2...	4.05	3.32	2.83	3.73	3.48	17..	.....	3.67	2.95	3.16	3.19	4.52
3...	3.89	3.24	2.83	3.52	3.39	18..	.....	3.62	2.93	3.15	3.25	4.60
4...	3.77	3.18	2.84	3.38	3.38	19..	4.08	3.52	2.92	3.13	3.24	5.59
5...	3.68	3.16	2.84	3.30	3.36	20..	4.06	3.46	2.89	3.10	3.35	5.57
6...	3.74	3.16	2.85	3.24	3.35	21..	4.00	3.39	2.87	3.09	3.95	5.19
7...	3.70	3.15	2.85	3.19	3.58	22..	3.98	3.36	2.87	3.07	4.00	4.95
8...	3.64	3.14	2.85	3.16	4.21	23..	4.25	3.36	2.85	3.04	3.55	4.83
9...	4.16	3.12	2.85	3.15	4.50	24..	4.04	3.35	2.85	3.04	3.73	4.67
10...	5.31	3.10	2.87	3.13	4.46	25..	3.97	3.36	2.85	3.02	3.61	4.61
11...	4.78	3.07	2.93	3.12	4.32	26..	4.00	3.50	2.84	3.02	3.52	5.23
12...	4.39	3.04	2.94	3.13	5.94	27..	5.08	4.44	2.83	3.02	3.47	5.20
13...	4.07	3.03	2.97	3.16	6.30	28..	6.04	4.09	2.83	3.01	3.44	5.13
14...	3.88	3.02	3.04	3.21	5.62	29..	5.58	3.82	2.82	3.28	3.42	5.13
15...	3.76	3.01	3.24	3.21	5.22	30..	4.96	3.62	2.82	3.38	3.38	5.29
							31..	4.60	3.49	.....	4.08	.....	6.88

Discharge measurements of Meadow River near
Russellville, W. Va., in 1909.

Date	Hydrographer	Width Feet	Area of section Sq. Ft.	Gage height Feet	Dis- charge Sec. Ft.
April 5.....	H. J. Jackson	117	545	5.84	686
April 13.....	H. J. Jackson.....	108	378	4.57	260

Daily gage height, in feet, of Meadow River near
Russellville, W. Va., for 1909.

(Jacob R. Bays, observer).

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	6.79	6.33	5.80	6.05	8.08	4.76	4.33	3.48	2.94	3.16	3.76	3.73
2.....	6.45	5.94	5.50	5.75	8.16	4.51	5.40	3.56	2.90	3.14	3.72	3.71
3.....	5.70	5.65	5.43	5.70	7.54	4.42	5.06	3.90	2.89	3.10	3.66	3.70
4.....	5.33	5.45	6.36	5.65	6.76	4.40	4.72	3.60	2.94	3.06	3.64	3.68
5.....	5.99	5.39	6.30	5.88	6.22	4.68	4.32	3.51	3.16	3.02	3.56	3.66
6.....	8.17	5.59	6.23	5.94	5.72	4.78	4.90	3.38	3.14	3.00	3.50	3.60
7.....	7.59	5.65	6.90	5.73	5.42	4.78	6.48	3.29	3.30	3.00	3.45	3.60
8.....	6.78	5.46	8.21	5.40	5.32	4.52	6.04	3.23	3.26	2.99	3.42	3.74
9.....	6.08	5.37	8.49	5.16	5.32	4.41	5.56	3.20	3.26	3.00	3.52	3.88
10.....	5.48	6.72	9.29	5.02	5.84	4.64	5.11	3.26	3.60	3.03	3.68	3.79
11.....	5.22	7.37	8.62	4.82	7.44	4.97	4.53	3.24	4.52	3.18	5.00	3.80
12.....	5.12	6.82	7.42	4.68	6.92	5.18	4.26	3.18	4.46	3.75	4.88	3.96
13.....	4.96	6.48	6.74	4.58	6.39	5.07	4.18	3.12	4.12	4.40	4.56	4.32
14.....	4.82	6.33	6.92	8.72	5.82	5.37	4.68	3.10	3.74	4.15	4.38	6.13
15.....	6.75	6.15	6.78	8.70	5.36	5.69	4.48	3.20	3.52	3.95	4.21	6.12
16.....	8.04	7.49	6.35	7.48	5.07	5.42	4.18	4.36	3.40	3.76	4.08	5.96
17.....	7.68	7.79	5.93	6.58	4.84	5.10	3.96	5.38	3.36	3.66	.....	5.20
18.....	7.15	7.03	5.55	5.88	4.60	5.16	3.80	4.86	3.40	3.64	.....	5.32
19.....	6.55	6.53	5.27	5.44	4.44	4.94	3.90	4.34	3.62	3.67	.....	5.44
20.....	6.14	6.55	5.12	5.22	4.34	4.60	3.82	3.98	3.48	3.52	.....	5.09
21.....	6.03	6.62	5.07	5.11	4.30	4.36	3.74	3.69	3.22	3.47	.....	4.65
22.....	6.08	7.20	5.39	6.26	4.62	4.26	3.64	3.49	3.24	3.45	.....	4.40
23.....	6.14	7.06	5.49	7.40	4.81	4.12	3.64	3.34	3.20	3.51	.....	4.26
24.....	6.16	6.88	5.65	7.57	4.68	4.25	3.80	3.28	3.26	3.82	.....	4.08
25.....	5.93	7.10	6.71	6.98	4.49	4.35	3.97	3.19	4.06	4.43	.....	4.06
26.....	5.74	6.84	8.03	6.39	4.98	4.24	3.38	3.12	3.74	4.42	.....	4.04
27.....	5.58	6.52	7.96	5.96	6.00	4.02	3.64	3.10	3.56	4.40	.....	3.95
28.....	5.36	6.20	8.75	5.75	6.16	3.92	3.61	3.08	3.43	4.28	.....	3.94
29.....	5.28	.....	8.20	5.58	6.05	3.83	3.52	3.05	3.38	4.10	.....	3.91
30.....	5.22	.....	7.31	5.98	5.55	3.99	3.54	3.01	3.13	4.01	.....	3.88
31.....	6.31	.....	6.55	.....	5.08	.....	3.48	2.98	.....	3.85	.....	3.86

“NOTE.—Ice conditions December 9 to 31. December 21, thickness of ice 0.3 foot. December 26 to 31, gage readings are to top of ice.”

Discharge measurements of Meadow River near
Russellville, W. Va., in 1910.

Date	Hydrographer	Width Feet	Area of section Sq. Ft.	Gage height Feet	Dis- charge Sec. Ft.
March 24.....	C. T. Bailey.....	115	350	4.51	233
March 26.....	C. T. Bailey.....	115	339	4.35	216
October 14.....	C. T. Bailey.....	102	243	3.61	62.9
October 15.....	C. T. Bailey.....	99	226	3.46	47.1

Daily gage height, in feet, of Meadow River near
Russellville, W. Va., for 1910.

(J. R. Bays, observer).

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	3.86	^a 6.48	8.27	4.02	5.62	4.59	4.42	3.62	3.24	4.37	3.62	5.40
2.....	4.11	6.42	8.25	3.98	5.30	4.59	4.20	3.49	3.68	4.17	3.68	^a 5.59
3.....		6.26	7.63	4.02	5.00	4.52	4.14	3.47	4.25	3.89	3.71	6.34
4.....	8.20	6.20	6.91	4.12	4.93	4.44	4.34	3.45	4.08	3.58	3.77	5.61
5.....	7.31	5.73	6.33	4.89	4.78	4.71	4.27	3.43	4.95	3.46	3.82	5.16
6.....	6.60	^a 6.11	5.90	4.83	4.64	8.89	4.53	3.39	4.91	3.36	3.83	4.92
7.....	8.66	6.44	5.63	4.72	4.50	8.92	4.97	3.35	4.46	3.35	3.80	4.73
8.....	7.93	6.08	5.37	4.56	4.66	7.46	5.23	3.34	4.12	3.49	3.76	4.79
9.....	7.02	5.89	5.13	4.38	5.40	7.36	4.59	3.32	3.94	4.17	3.70	4.71
10.....	6.59	5.76	5.01	4.25	5.82	5.99	4.69	3.29	3.89	4.35	3.69	4.61
11.....	^a 8.18	5.62	4.93	4.18	5.73	6.62	4.48	3.20	3.79	4.03	3.68	4.52
12.....	7.52	5.47	4.84	4.38	6.06	7.16	4.26	3.22	3.67	3.81	3.66	4.34
13.....	7.20	5.36	4.83	5.85	6.74	7.94	4.48	3.38	3.91	3.66	3.64	4.31
14.....	6.90	5.28	4.59	6.22	6.28	7.64	4.71	3.42	4.29	3.52	3.62	4.22
15.....	6.54	5.15	5.75	5.90	5.79	7.52	4.63	3.34	4.60	3.45	3.62	4.16
16.....	6.07	5.47	5.45	5.57	5.40	9.04	4.47	3.72	4.21	3.39	3.62	4.14
17.....	6.02	8.61	5.23	5.37	5.12	9.83	4.41	3.60	3.89	3.33	3.64	4.04
18.....	6.10	8.85	5.04	6.54	5.08	8.60	4.63	3.34	3.61	3.30	3.57	4.03
19.....	8.08	8.28	4.81	6.82	5.20	7.52	5.39	3.32	3.51	3.26	3.51	4.20
20.....	7.42	7.48	4.61	6.74	5.10	6.38	5.56	3.38	3.49	3.23	3.42	4.39
21.....	7.78	6.62	4.65	7.49	5.22	5.62	5.13	3.27	3.45	3.20	3.42	4.34
22.....	8.62	6.74	4.61	7.94	5.50	5.35	4.66	3.40	3.43	3.30	3.47	4.32
23.....	7.55	7.28	4.56	8.09	5.63	5.16	4.35	3.54	3.39	3.46	3.49	4.48
24.....	6.89	6.87	4.47	8.05	5.50	5.04	4.27	3.43	3.33	3.66	3.48	5.05
25.....	6.00	6.31	4.40	7.42	5.44	4.94	3.97	3.29	3.38	3.52	3.78	5.88
26.....	5.63	5.82	4.32	6.76	5.41	4.66	3.90	3.26	3.49	3.44	4.52	5.63
27.....	5.67	5.57	4.27	6.34	5.22	4.60	3.77	3.22	3.72	3.38	4.54	5.52
28.....	6.08	5.91	4.20	6.38	5.04	4.79	4.27	3.15	4.11	3.54	5.36	5.26
29.....	5.98		4.15	6.29	4.81	4.92	4.27	3.11	4.09	3.63	6.37	5.96
30.....	5.70		4.70	5.98	4.66	4.66	4.00	3.10	4.39	3.84	5.89	10.26
31.....	5.50		4.08		4.69		3.77	3.14		3.72		9.35

^aIce gorge reported by observer Jan. 11, Feb. 1 and 6, and Dec. 2.

“NOTE.—Relation of gage height to discharge affected by ice about Jan. 1 to 13, Feb. 1 to 9, and Dec. 2 to 24.

"The following discharge measurement of Meadow River near Russellville, W. Va., was made by C. T. Bailey by wading at section above regular measuring section:

"July 29, 1911: Gage height, 3.03 feet; discharge, 15.2 second-feet."

Daily gage height, in feet, of Meadow River near
Russellville, W. Va., for 1911.

(J. R. Bays, observer).

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	8.44	9.19	4.96	5.85	5.07	4.41	3.32	2.90	3.76	3.17	3.98	5.34
2.....	10.09	8.57	4.98	5.76	5.20	4.53	3.20	2.87	4.04	3.32	3.89	5.16
3.....	11.04	7.62	4.84	6.26	5.42	4.10	3.13	2.84	3.72	3.76	3.81	4.96
4.....	9.74	6.93	4.79	8.34	5.35	3.84	3.22	2.80	3.46	4.28	3.74	4.73
5.....	7.97	6.51	4.67	9.98	5.18	3.76	3.58	2.75	3.26	4.22	3.69	4.80
6.....	6.84	6.02	8.19	9.52	4.96	3.72	3.42	2.72	3.22	4.11	3.94	4.60
7.....	6.14	5.74	9.24	8.43	4.80	3.89	3.98	2.95	3.20	3.94	7.33	4.42
8.....	5.78	5.58	8.59	7.64	4.68	3.66	3.72	3.44	3.16	4.33	7.02	4.30
9.....	5.30	6.50	7.31	8.00	4.60	3.52	3.58	3.42	3.03	4.43	6.36	4.34
10.....	5.80	6.90	7.28	7.88	4.52	3.40	3.37	3.19	2.98	4.32	5.86	4.30
11.....	5.04	6.69	7.70	7.26	4.44	3.37	3.38	3.25	3.03	4.60	5.38	4.32
12.....	4.91	6.32	7.30	6.65	4.31	3.36	4.10	3.26	3.28	5.10	4.98	4.38
13.....	5.80	5.90	6.80	6.51	4.23	3.64	3.98	3.14	3.36	4.78	5.18	4.40
14.....	7.22	5.53	6.34	6.42	4.13	3.98	3.69	3.01	3.54	4.55	5.29	4.40
15.....	7.18	5.26	6.02	7.52	4.05	3.83	3.45	2.94	3.32	5.15	5.98	4.35
16.....	7.53	4.95	5.78	7.72	3.99	3.67	3.26	2.94	3.41	5.40	5.16	4.40
17.....	6.94	4.76	5.52	7.15	3.94	3.56	3.20	2.90	3.95	5.12	4.93	4.68
18.....	6.22	4.70	5.42	6.49	3.92	3.56	3.18	2.90	3.78	9.00	5.62	5.04
19.....	5.77	4.82	5.36	5.98	3.88	3.58	3.10	3.01	3.56	7.72	6.30	5.02
20.....	5.48	5.38	7.22	6.93	3.81	3.72	3.06	3.00	3.41	6.58	5.88	4.94
21.....	5.60	5.58	7.08	7.46	3.75	3.66	3.03	2.98	3.32	5.88	5.52	4.78
22.....	7.24	5.54	6.52	7.40	3.67	3.58	3.11	2.91	3.84	5.24	5.24	4.74
23.....	7.17	5.28	6.16	7.63	3.62	3.44	3.08	2.85	3.88	5.14	4.99	5.24
24.....	6.81	5.73	5.70	6.98	3.57	3.34	3.12	2.82	3.82	5.24	5.01	6.30
25.....	6.35	5.10	5.35	6.49	3.58	3.28	3.14	2.78	3.63	4.96	5.42	6.39
26.....	6.22	5.03	5.18	5.92	3.68	3.24	3.10	2.76	3.48	4.71	5.42	6.57
27.....	7.06	5.00	5.40	5.54	3.62	3.54	3.04	2.74	3.31	4.52	5.35	7.28
28.....	7.18	4.96	5.84	5.28	3.56	3.55	3.03	2.72	3.28	4.37	5.41	7.30
29.....	8.06	.....	5.76	5.12	4.52	3.44	3.02	2.90	3.24	4.24	5.68	6.72
30.....	13.02	.....	5.84	5.04	4.28	3.40	3.00	3.00	3.19	4.14	5.55	6.20
31.....	11.06	.....	5.94	.....	3.88	.....	2.94	3.12	.....	4.03	.....	6.11

"NOTE.—Observer reported ice at follows: Jan. 10 and Feb. 22, ice gorged; Feb. 24 and Dec. 5, backwater from ice."

"Accuracy.—In the fall backwater is sometimes caused at the gage by leaves lodging at the riffle below the gage. Because of an error in the gage found by wye levels on November 20, 1913 (before this report—Water-Supply Paper 323—was prepared), gage heights of discharge measurements and daily gage heights for this station for 1909, 1910, and 1911, published in Water-Supply Papers 263, 283, and 303, should be corrected as follows:

"February 21, 1909, to June 7, subtract 0.02 foot.

"June 8 to September 24, subtract 0.03 foot.

"September 25, 1909, to January 11, 1910, subtract 0.04 foot

"January 12 to April 28, subtract 0.05 foot.

"April 29 to August 15, subtract 0.06 foot.

"August 16 to November 30, subtract 0.07 foot.

"December 1, 1910, to March 17, 1911, subtract 0.08 foot.

"March 18 to July 3, subtract 0.09 foot.

"July 4 to October 19, subtract 0.10 foot.

"October 20 to December 31, 1911, subtract 0.11 foot.

"The necessary corrections have been applied to the gage heights in the following tables:

Discharge measurements of Meadow River near Russellville, W. Va., in 1912.

Date	Hydrographer	Gage height Feet	Dis- charge Sec. Ft.
March 27.....	C. T. Bailey.....	7.02	1,370
March 30.....	C. T. Bailey.....	9.44	3,230

Daily gage height, in feet, of Meadow River near Russellville, W. Va., for 1912.

(J. R. Bays, observer).

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	6.3	6.8	6.4	7.5	6.9	3.81	4.55	3.79	4.15	3.83	3.86	3.56
2.....	6.3	6.4	5.9	7.8	6.3	3.73	4.06	3.69	4.09	3.71	3.82	3.74
3.....	6.0	5.8	5.35	8.7	6.0	3.65	3.85	3.57	3.89	3.60	3.78	3.98
4.....	5.7	5.6	5.0	8.1	5.6	3.57	4.07	3.39	3.73	3.51	3.71	4.65
5.....	6.3	5.5	4.95	7.0	5.25	3.50	4.5	3.35	3.71	3.42	3.60	6.0
6.....	5.6	5.2	4.8	6.3	5.15	3.42	4.8	3.29	3.67	3.33	3.56	6.4
7.....	5.5	5.1	4.7	5.8	6.1	3.37	4.9	3.23	3.59	3.27	4.41	6.6
8.....	5.3	5.05	4.7	5.4	6.3	3.29	4.7	3.18	3.49	3.24	7.9	6.2
9.....	5.1	4.75	5.9	5.8	6.1	3.26	4.17	3.15	3.35	3.19	6.9	5.6
10.....	4.85	4.43	6.3	5.5	5.7	3.21	4.42	3.14	3.27	3.15	5.9	5.15
11.....		4.38	6.2	5.3	5.4	3.09	4.29	3.13	3.23	3.12	5.45	4.9
12.....		4.26	6.4	5.05	9.3	3.04	4.23	3.11	3.19	3.10	5.0	4.7
13.....		4.36	8.3	4.9	9.4	3.00	4.09	3.09	3.17	3.10	4.75	4.55
14.....		4.32	8.2	4.8	8.5	2.95	3.84	3.08	3.05	3.12	4.65	4.35
15.....	4.36	4.22	10.9	4.7	7.2	2.91	4.17	3.06	2.94	3.15	4.55	4.33
16.....		4.18	12.2	4.9	9.1	2.89	4.11	3.05	2.96	3.20	4.41	4.28
17.....		4.19	9.6	5.1	11.1	2.87	4.11	3.01	2.94	3.27	4.29	4.23
18.....		4.26	7.8	5.5	9.1	3.05	4.95	2.98	2.98	3.24	4.22	4.17
19.....		4.43	7.1	5.7	7.2	3.38	4.55	3.09	3.00	3.44	4.14	4.14
20.....		4.85	6.8	5.5	6.3	3.72	3.89	3.41	2.98	4.46	4.07	4.07
21.....		7.1	7.3	5.3	5.6	3.80	3.66	4.04	2.95	4.41	4.02	3.97
22.....	5.4		7.3	5.1	5.1	3.52	3.57	4.8	2.94	4.20	3.96	3.83
23.....		8.3	7.0	5.5	4.85	3.34	3.43	4.55	3.14	4.41	3.93	3.80
24.....		7.1	7.9	5.6	4.65	3.25	3.35	4.23	4.10	5.1	3.90	3.76
25.....		6.4	8.8	5.35	4.47	3.15	4.07	3.84	4.55	5.25	3.89	.....
26.....		7.3	8.3	5.2	4.34	3.41	5.15	3.59	4.46	4.85	3.87	3.79
27.....		10.9	7.1	5.5	4.21	3.83	4.7	3.44	4.22	4.7	3.82	3.91
28.....		8.4	6.5	6.8	4.07	6.2	4.32	3.37	4.10	4.26	3.70	3.98
29.....	4.37	7.2	8.7	6.5	4.04	5.7	3.97	3.81	4.00	4.20	3.46	3.96
30.....	7.5		9.5	7.0	4.01	5.25	3.89	4.34	3.89	4.06	3.88	5.00
31.....	7.3		8.5		3.89		3.83	4.19		3.94		8.0

*Gage height to top of ice.

"NOTE.—Relation of gage height to discharge affected by ice about Jan. 5-29 and Feb. 4-8. Observer reported as follows: Jan. 5, ice gorge; Jan. 10, river frozen up solid, ice 4 inches thick at gage; Jan. 15, control frozen, river entirely frozen over, ice 5 inches thick at gage; Jan. 22 and 29, control open, river partly frozen over, ice 6 and 4 inches thick at gage; Jan. 30, ice gone out. No notes relative to ice during February. In October and November the gage observer reported that false work for the construction of the piers of the new county highway bridge below the gage was placed about the middle of October; that piers were started Oct. 28 and finished Nov. 6, and that the bridge would not be completed until after Dec. 31, 1912.

"No discharge measurements were made at this station during the year ending September 30, 1913."

Daily gage height, in feet, of Meadow River near Russellville,
W. Va., for the year ending Sept. 30, 1913.

(J. R. Bays, observer).

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	3.83	3.86	3.56	7.0	6.4	6.5	5.8	5.3	6.1	3.42	3.18	3.04
2.....	3.71	3.82	3.74	6.4	6.2	6.2	5.4	5.05	5.6	3.32	3.13	3.01
3.....	3.60	3.78	3.98	6.3	6.4	5.45	5.1	4.85	5.2	3.27	3.11	2.96
4.....	3.51	3.71	4.65	6.8	8.5	5.6	4.9	4.7	5.6	4.85	3.03	2.91
5.....	3.42	3.60	6.0	6.8	8.0	5.3	4.8	4.6	6.6	4.6	3.00	2.88
6.....	3.33	3.56	6.4	6.8	7.0	5.2	4.7	4.43	6.1	5.1	3.01	2.85
7.....	3.27	4.41	6.6	8.8	6.2	5.05	4.5	4.85	6.3	5.0	2.96	2.91
8.....	3.24	7.9	6.2	.....	7.7	4.75	4.41	4.75	7.2	4.31	2.93	2.97
9.....	3.19	6.9	5.6	8.9	7.4	4.65	4.32	4.6	7.2	3.91	2.90	3.07
10.....	3.15	5.9	5.15	7.5	6.6	4.9	4.26	4.45	6.5	3.82	2.85	3.10
11.....	3.12	5.45	4.9	7.2	6.5	6.6	4.22	4.33	5.7	3.82	.....	3.16
12.....	3.10	5.0	4.7	6.8	6.8	7.7	4.6	4.25	5.25	3.92	.....	3.10
13.....	3.10	4.75	4.55	6.6	7.5	7.1	5.6	4.19	4.9	3.80	3.71	3.05
14.....	3.12	4.65	4.35	6.4	7.5	8.3	5.6	4.12	4.6	3.63	3.40	2.97
15.....	3.15	4.55	4.33	6.0	7.3	10.1	^a 9.8	4.07	4.35	3.73	3.22	2.93
16.....	3.20	4.41	4.28	5.6	6.7	8.9	.....	4.05	4.19	3.92	3.22	2.89
17.....	3.27	4.29	4.23	5.35	5.3	7.5	7.4	5.0	4.14	4.10	3.18	2.91
18.....	3.24	4.22	4.17	5.2	4.8	6.6	6.5	5.6	4.27	3.96	3.15	2.95
19.....	3.44	4.14	4.14	5.1	4.7	6.0	5.9	5.2	3.81	3.89	3.22	3.23
20.....	4.46	4.07	4.07	5.05	4.65	5.5	5.3	4.95	3.67	6.0	3.26	3.37
21.....	4.41	4.02	3.97	5.2	4.75	5.3	5.1	6.8	3.59	5.6	3.11	3.71
22.....	4.20	3.96	3.83	5.45	5.1	5.1	4.9	6.6	3.59	5.1	3.54	5.5
23.....	4.41	3.93	3.80	5.4	5.3	4.85	4.75	6.8	3.63	4.28	4.29	4.7
24.....	5.1	3.90	3.76	6.0	5.35	4.75	4.6	.....	3.62	4.06	4.44	4.2
25.....	5.25	3.89	.....	6.9	5.25	4.7	4.48	7.6	3.59	3.98	3.92	3.71
26.....	4.85	3.87	3.79	6.8	5.0	5.15	4.43	6.7	3.90	3.80	3.60	3.61
27.....	4.7	3.82	3.91	6.6	5.05	8.5	4.7	8.0	3.87	3.68	3.40	3.42
28.....	4.26	3.70	3.98	6.5	6.05	10.4	5.2	.....	3.87	3.53	3.30	.....
29.....	4.20	3.46	3.96	6.3	.....	8.6	5.35	8.3	3.64	3.42	3.18	3.25
30.....	4.06	3.38	5.0	6.1	.....	7.4	5.4	7.3	3.53	3.35	3.10	3.40
31.....	3.94	.....	8.0	6.0	.....	6.5	.....	6.6	.....	3.26	3.04	.....

^aGage height estimated by observer.

"NOTE.—Observer reported backwater from ice Feb. 8 and 9. Discharge relation affected by ice about Feb. 7 to 18, 1913.

"Water too high for observer to reach gage Jan. 8 and Apr. 15-16."

Discharge measurements of Meadow River near Russellville,
W. Va., during the year ending Sept. 30, 1914.

Date	Made by	Gage height Feet	Dis- charge Sec. Ft.
November 18....	Peterson and Walters.....	9.04	2,830
November 20....	Peterson and Walters.....	6.50	1,050

Daily gage height, in feet, of Meadow River near Russellville,
W. Va., for the year ending Sept. 30, 1914.

(J. R. Bays, observer).

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	3.81	4.39	6.8	5.2	7.7	6.0	7.1	5.3	3.23	2.61	2.78	3.56
2.....	4.29	4.35	8.6	5.2	7.2	6.2	7.6	5.0	3.19	2.59	2.78	3.51
3.....	4.65	4.22	7.8	5.15	6.7	6.1	7.6	4.8	3.15	2.61	2.73	3.45
4.....	5.8	4.10	7.0	6.6	6.2	6.1	7.0	4.7	3.11	2.61	2.70	3.36
5.....	5.25	3.99	6.4	6.3	5.8	6.1	6.5	4.8	3.09	2.85	2.66	3.25
6.....	4.65	3.91	5.9	6.0	5.5	6.0	6.1	5.5	3.27	2.85	2.62	3.19
7.....	4.29	3.86	5.6	5.7	6.4	5.7	5.7	6.6	3.25	2.80	2.58	3.13
8.....	4.05	3.82	6.6	5.6	6.9	5.45	6.5	6.5	3.23	2.78	2.58	3.05
9.....	3.92	4.43	6.3	5.8	6.5	5.15	8.4	6.4	3.18	2.75	2.98	2.99
10.....	3.75	5.1	6.0	6.3	6.2	4.85	7.6	6.2	3.14	2.84	3.14	2.92
11.....	3.66	5.3	5.8	6.6	5.8	5.9	6.7	5.9	3.09	2.79	3.07	2.90
12.....	3.59	5.25	5.45	6.3	5.45	7.2	6.2	5.6	3.01	2.74	3.16	2.97
13.....	3.54	6.0	5.15	7.7	5.35	6.6	5.9	5.45	2.95	2.70	3.24	3.01
14.....	3.63	6.7	4.95	7.1	5.3	6.5	5.6	5.2	2.91	2.82	3.20	2.99
15.....	3.51	7.9	4.85	6.7	5.6	6.9	5.35	4.85	2.85	3.17	3.13	2.99
16.....	3.45	(a)	4.8	6.4	5.5	7.9	8.2	4.6	2.81	3.71	3.09	3.01
17.....	3.42	(a)	4.7	5.9	5.4	9.6	8.7	4.5	2.75	3.67	2.97	3.00
18.....	3.41	8.4	4.6	5.7	5.8	9.9	7.8	4.42	2.73	3.52	2.90	2.94
19.....	3.42	7.3	4.55	5.7	6.7	7.8	7.4	4.34	2.75	3.41	2.84	2.89
20.....	3.86	6.4	4.5	5.8	8.0	6.9	7.6	4.28	2.69	3.36	2.75	2.85
21.....	4.65	5.8	4.48	10.1	8.1	6.3	7.4	4.18	2.71	3.31	3.48	2.81
22.....	4.9	5.35	4.44	8.9	7.1	6.0	7.1	4.06	2.69	3.22	3.21	2.78
23.....	4.75	4.95	4.43	7.6	7.0	6.4	6.7	3.95	2.79	3.14	2.89	2.81
24.....	5.0	4.75	4.42	6.9	6.7	5.8	6.2	3.88	2.79	3.04	2.85	2.89
25.....	6.8	4.55	4.6	9.5	6.5	6.5	5.7	3.80	2.73	2.98	3.30	2.84
26.....	8.5	4.46	5.8	8.2	6.2	8.2	5.5	3.72	2.69	2.84	3.51	2.75
27.....	7.6	4.36	5.8	7.4	6.1	9.5	6.3	3.66	2.66	2.85	4.01	2.70
28.....	6.6	4.7	5.8	7.3	6.0	9.0	6.4	3.58	2.63	2.79	4.07	2.67
29.....	5.7	7.0	5.5	7.1	.....	8.6	6.0	3.47	2.63	2.76	3.85	2.64
30.....	4.85	6.5	5.4	7.0	.....	7.8	5.6	3.37	2.61	2.74	3.70	2.62
31.....	4.55	.....	5.3	7.7	.....	7.2	.....	3.29	.....	2.78	3.62	.....

^aObserver unable to reach gage; water too high. Flood reached a stage of 10.8 feet on Nov. 17 as determined when the station was visited on Nov. 18, 1913.

"NOTE.—Discharge relation probably affected by ice about Jan. 13-20, Feb. 15-18, and Mar. 1-6.

"The following discharge measurements were made by Mathers and Morgan of Meadow River near Russellville, W. Va.:

"October 30, 1914: Gage height, 3.39 feet; discharge, 49 second-feet. Gage height, 3.36 feet; discharge, 45 second-feet."

Daily gage height, in feet, of Meadow River near Russellville, W. Va., for the year ending Sept. 30, 1915.

(J. R. Bays, observer).

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	2.60	3.28	3.47	6.6	7.5	5.6	.....	7.35	4.61	3.05	3.02	3.11
2.....	2.58	3.28	4.26	6.2	12.2	5.4	4.36	6.69	4.80	3.27	3.06	3.07
3.....	2.56	3.24	5.1	5.8	12.9	5.1	4.32	6.31	4.86	3.46	3.14	3.04
4.....	2.55	3.22	5.7	5.35	10.1	4.9	4.32	6.12	4.78	3.61	.....	3.11
5.....	2.58	3.20	7.8	5.0	8.2	4.85	4.30	6.44	4.60	3.55	.....	4.86
6.....	2.65	3.18	8.4	4.95	7.6	4.8	4.29	6.22	4.40	3.49	.....	4.86
7.....	2.64	3.16	7.7	12.8	7.3	4.95	4.28	6.00	4.27	3.43	.....	4.70
8.....	2.62	3.14	6.5	11.8	7.0	5.05	4.38	5.55	4.45	3.46	.....	4.33
9.....	2.61	3.12	6.0	8.6	6.6	4.95	4.40	5.22	4.32	4.30	.....	3.98
10.....	2.64	3.10	6.0	7.2	6.2	4.9	4.40	5.06	4.08	4.19	.....	3.77
11.....	2.72	3.08	6.0	6.7	6.0	5.3	4.42	4.96	3.90	4.04	.....	3.42
12.....	2.72	3.06	5.9	6.5	5.6	5.4	4.66	4.86	3.86	3.89	.....	3.31
13.....	2.74	3.04	.....	6.3	5.3	5.3	4.77	4.77	3.88	3.68	.....	3.24
14.....	2.82	3.04	5.7	5.8	5.1	5.2	4.73	4.68	3.84	3.53	.....	3.18
15.....	3.04	3.08	5.6	6.2	7.0	5.2	4.64	4.56	5.46	3.40	3.33	3.10
16.....	3.34	3.12	5.1	6.2	8.0	5.3	4.59	4.45	5.34	3.53	3.25	3.08
17.....	4.02	3.51	4.65	8.2	7.4	5.4	4.54	4.38	5.06	3.47	3.11	3.06
18.....	4.15	3.80	4.35	10.2	7.0	5.35	4.51	4.29	4.80	3.51	3.39	3.05
19.....	4.06	3.74	4.35	11.8	6.5	5.3	4.48	4.18	4.50	3.46	3.37	3.04
20.....	3.80	3.62	5.45	10.8	6.0	5.3	4.44	4.12	4.24	3.55	3.33	3.08
21.....	3.60	3.55	6.4	8.1	5.5	5.35	4.37	4.03	4.05	3.93	3.27	3.31
22.....	3.50	3.48	7.1	6.9	5.05	5.1	4.30	3.91	3.84	3.84	3.20	3.66
23.....	3.42	3.43	6.7	6.5	4.85	4.9	4.24	3.84	3.66	3.57	3.13	3.50
24.....	3.36	3.40	6.2	6.0	4.9	4.75	4.80	3.82	3.58	3.45	3.07	3.58
25.....	3.32	3.39	5.9	6.0	5.8	4.6	5.21	3.78	3.48	3.37	3.07	3.44
26.....	3.32	3.38	5.6	5.8	6.6	4.55	5.16	3.78	3.40	3.34	3.03	3.40
27.....	3.48	3.36	5.35	5.6	6.2	4.6	5.08	3.82	3.32	3.30	2.99	3.60
28.....	3.59	3.35	5.15	5.5	5.7	4.6	6.12	3.78	3.25	3.25	2.98	3.97
29.....	3.45	3.32	5.1	5.6	.....	4.48	8.48	3.74	3.17	3.19	2.98	3.90
30.....	3.37	3.32	7.0	5.8	.....	4.42	7.98	4.22	3.10	3.13	2.99	3.78
31.....	3.30	.....	7.3	.....	.....	4.37	.....	4.34	.....	3.07	3.15	.....

"NOTE.—River partly frozen over Dec. 14 and 15; complete ice cover Dec. 16-18. Gage read to top of ice Dec. 26. Gage was stolen Aug. 4 and replaced Aug. 15; record missing.

"The following discharge measurements for Meadow River near Russellville, W. Va., were made by B. E. Jones:

"August 21, 1916: Gage height, 5.01 feet; discharge, 376 second-feet.

"August 24, 1916: Gage height, 5.70 feet; discharge, 632 second-feet."

Daily gage height, in feet, of Meadow River near Russellville, W. Va., for the year ending Sept. 30, 1916.

(J. R. Bays, observer).

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	7.74	3.41	4.73	7.31	7.74	6.19	7.06	5.23	5.62	.....	4.43	3.64
2.....	9.40	3.30	4.68	7.16	8.05	5.79	.....	5.08	5.50	.....	5.80	3.58
3.....	7.68	3.27	4.61	6.56	7.59	5.55	6.43	5.00	5.51	.....	6.97	3.56
4.....	6.88	3.85	4.55	6.02	7.12	5.44	5.77	5.13	5.58	.....	6.81	3.50
5.....	5.70	3.33	4.49	5.75	6.72	5.39	5.38	5.16	5.52	.....	7.88	3.46
6.....	5.32	3.31	4.39	5.58	6.44	6.74	5.16	5.10	5.47	.....	7.47	3.40
7.....	4.94	3.30	4.29	5.84	6.08	10.03	5.05	4.99	5.50	3.50	6.88	3.36
8.....	4.36	3.29	4.18	5.91	5.81	9.61	4.99	4.78	5.54	3.47	6.69	3.36
9.....	4.03	3.27	4.10	.....	6.22	8.70	5.04	4.57	5.51	3.45	8.57	3.52
10.....	3.90	3.25	4.03	5.66	6.39	7.48	5.23	4.42	5.62	3.65	7.97	3.58
11.....	3.80	3.25	3.90	7.30	6.33	6.84	7.08	4.28	5.58	3.62	7.52	3.51
12.....	3.74	3.23	3.98	9.22	6.28	6.37	9.09	4.16	5.46	4.59	7.21	3.48
13.....	3.69	3.30	3.93	9.09	6.23	5.89	9.33	4.10	5.34	4.55	6.78	3.46
14.....	3.60	3.23	3.91	8.53	6.20	5.63	8.65	4.07	5.25	4.47	6.41	3.49
15.....	3.51	4.65	3.89	7.12	6.12	6.10	7.01	4.03	5.62	4.38	6.25	4.68
16.....	3.46	5.53	3.90	6.47	5.94	6.39	6.29	4.00	6.72	4.51	5.71	4.64
17.....	3.45	5.50	5.40	6.11	5.68	6.14	6.05	4.04	6.87	6.05	8.17	4.51
18.....	3.42	5.47	9.57	6.96	5.56	5.91	5.78	4.06	6.74	5.89	7.09	4.43
19.....	3.48	6.12	8.89	6.47	5.48	5.70	5.29	4.02	6.49	5.57	6.65	4.17
20.....	3.93	6.41	7.25	.....	5.52	5.49	5.02	3.99	6.24	5.33	6.33	3.84
21.....	3.86	6.19	6.77	5.98	5.54	5.37	4.81	3.92	5.91	5.15	5.63	3.64
22.....	3.75	5.75	6.36	.....	5.48	6.45	4.75	3.86	5.57	6.19	5.17	3.51
23.....	3.66	5.54	5.89	6.68	5.66	6.99	4.70	4.37	5.09	7.08	6.12	3.49
24.....	3.62	5.28	5.53	6.38	6.51	6.76	4.55	5.75	4.78	6.81	5.55	3.46
25.....	3.59	5.10	5.43	5.98	9.56	6.37	4.92	5.82	4.72	5.62	4.98	3.44
26.....	3.56	4.99	6.17	5.66	9.44	6.06	5.55	5.60	5.18	5.01	4.57	3.38
27.....	3.53	4.91	6.05	5.40	8.30	6.19	5.71	5.48	4.80	4.78	4.36	3.30
28.....	3.48	4.87	5.96	5.18	7.44	8.83	5.72	5.40	4.54	4.99	4.11	3.30
29.....	3.45	4.81	8.67	5.11	6.53	8.91	5.62	5.32	4.33	4.91	3.96	3.45
30.....	3.44	4.77	11.23	6.54	.....	8.41	5.45	5.48	4.04	4.76	3.84	3.40
31.....	3.42	.....	9.12	6.50	.....	7.73	.....	5.78	.....	4.63	3.72	.....

"NOTE.—No gage height reported Jan. 9, 20, 22, Apr. 2, and July 1-6."

Anglins Creek.—Anglins Creek rises in Greenbrier County 1.5 miles southwest of the southern corner of Nicholas at an elevation of 3400 feet, flows northwestward into Nicholas, and

thence westward, emptying into Meadow River 1.9 miles north of Nallen at an elevation of 1765 feet, its total length being 13 miles, and its total fall 1635 feet. Most of its course is through virgin or cut-over woodland but there are farming communities on some of the high plateau lands. The area of its drainage basin is 45.41 square miles. Its principal tributaries in ascending order are Meadow Creek, Sugargrove Creek, Dorsey Branch, Eevenmile Fork, Jims Creek, and Kern Branch.

Collison Creek.—Collison Creek rises in Wilderness District $\frac{3}{4}$ mile southwest of McMillon School at an elevation of 2200 feet, flows northwestward and empties into Gauley River 2.5 miles east of Carnifex Ferry at an elevation of 1300 feet, its total length being 5.9 miles, and its total fall 900 feet. Most of its course is through virgin or cut-over woodland, there being farming communities along the high plateaus. The area of its drainage basin is 9.66 square miles.

McKee Creek.—McKee Creek rises against the Lonetree Mountain just west of Summersville at an elevation of 1750 feet, flows southward and empties into Gauley River 1.2 miles south of Gad at an elevation of 1400 feet, its total length being 3.9 miles and its total fall 350 feet. Most of its course is through a farming region, but near its mouth it plunges through a steep gorge into the parent stream. The area of its drainage basin is 5.44 square miles.

Hominy Creek.—Hominy Creek, one of the principal tributaries from the south, rises at the Grassy Knob in Greenbrier County at an elevation of 3600 feet, flows northward to Hominy Mill in Nicholas County, and thence southwestward, emptying into Gauley 1.2 miles above Hughes Ferry Bridge at an elevation of 1525 feet, its total length being 21.8 miles and its total fall 2075 feet. Throughout the most of its course it flows through virgin or cut-over woodland, there being farming communities in the vicinity of Hominy Falls as well as cleared land along the high plateaus on either side. The area of its drainage basin is 104.81 square miles. Its principal tributaries in ascending order are Mouse Fork, Deer Creek, Chestnut Camp Run, Middle Branch, Grassy Creek, Roaring Creek, Sugar Branch, and Prices Fork.

Deer Creek, the first large tributary of Hominy Creek, rises in Kentucky District one mile southwest of Chapman School at an elevation of 2475 feet, flows generally southwestward by an extremely tortuous course and empties into Hominy 2 miles southwest of Deepwell at an elevation of 1730 feet, its total length being 11.4 miles and its total fall 745 feet. Its course is mainly through virgin or cut-over woodland, but there are farming communities on the uplands. The area of its drainage basin is 27.50 square miles, including its main tributary, Jims Creek, which furnishes about one-third of the total drainage.

Grassy Creek rises 4 miles eastward from Leivasy at an elevation of 3100 feet, flows by general westward course and empties into Hominy Creek at Hominy Mill at an elevation of 2090 feet, its total length being 6.2 miles and its total fall 1010 feet. Its course is largely through cut-over woodland, although there are farms and small cleared areas along portions of its valley. The area of its drainage basin is 19.23 square miles, and its main tributaries in ascending order are Bowen Run, Brushy Meadow Creek, and Line Laurel Creek.

Muddlety Creek.—Muddlety Creek, an important tributary of Gauley River from the north, rises in Hamilton District, $2\frac{1}{2}$ miles northwest of Tioga, at an elevation of 2400 feet. From this point it flows southward $3\frac{1}{2}$ miles, then veers directly westward and follows this course $5\frac{1}{2}$ miles to Hookersville, and thence flows southward, emptying into the Gauley River at Brocks Bridge 2 miles southeast of Summersville, at an elevation of 1570 feet. Its upper course above Opal is through virgin or cut-over woodland, and from this point to Duffy Branch there is a wide flat valley thickly settled with farmers, the land being cleared half-way up the hillsides. From Duffy Branch southward to its mouth, the course of the stream is through a narrow valley lined with sandstone ledges on either side. That portion of the valley between Opal and Duffy Branch has been almost completely base-leveled, the fall of the stream being scarcely perceptible and there being numerous recent meanders. This condition is largely due to the fact that the Lower Gilbert, Dotson, and Nuttall Sandstones, with a combined thickness of 400 feet or

more, dipping in a direction reverse to that of the stream, have ponded the valley completely, preserving a vast amount of silty deposits that are almost ideal for farming land. The area of its drainage basin is 66.57 square miles, its total length from head to mouth being 19.8 miles, and its total fall 830 feet. Its principal tributaries in ascending order are Arbuckle Branch, Glade Creek, Duffy Branch, Phillips Run, Fockler Branch, Trout Run, Pearson Branch, Enoch Branch, McMillion Creek, Brushy Fork, Little Creek, Clear Fork, Laurel Fork, and Harris Fork.

Glade Creek rises one-half mile north of Persinger Post-office at an elevation of 2150 feet, flows generally southwestward and empties into Muddlety 2.3 miles northeast of Summersville at an elevation of 1800 feet, its total length being 5.2 miles, its total fall 350 feet, and the area of its drainage basin 7.54 square miles. A large part of its watershed is cleared land thickly settled with farmers, a considerable portion of its course being very gentle because of the ponding effect mentioned above.

McMillion Creek rises at the Hamilton-Beaver District Line $\frac{1}{2}$ mile west of Calvin at an elevation of 2250 feet, flows generally westward and empties into Muddlety Creek one mile northeast of Muddlety Post-office at an elevation of 1840 feet, its total length being 6.4 miles and its total fall 410 feet. The area of its drainage basin is 7.49 square miles. Throughout almost its entire length it has only a gentle current, having been reduced almost to base-level and having a wide fertile valley thickly settled with farmers.

Persinger Creek.—Persinger Creek rises near the Wildcat Knob, one mile northward from Nile Post-office, at an elevation of 2300 feet, flows northwestward about 1.5 miles and then turns sharply southwestward and flows into Gauley River 0.4 mile below Persinger Ford at an elevation of 1645 feet, its total length being 4.7 miles and its total fall 655 feet, and the area of its drainage basin 3.84 square miles. Its course between Hickman School and Persinger Post-office is gentle and its valley partly cleared, but from Persinger southwestward to its mouth the descent is much more rapid, its narrow channel having been cut through the group of sandstones mentioned above.

Beaver Creek.—Beaver Creek rises in Webster County $3\frac{1}{2}$ miles northwest of Cowen at an elevation of 2600 feet, flows by a tortuous but generally southwestward course to Upper Laurel Run near Tioga where it veers to the south, preserving this course with slight variations to Beaver Post-office, where it again turns southwestward, emptying into the Gauley River 1.3 miles eastward from Nile at an elevation of 1680 feet. Its course above Tioga is through cut-over woodland, but from Tioga southward to Beaver there is a wide valley and a thickly settled farming community. From Beaver to its mouth, its valley is narrow, with steep hills and heavy sandstone cliffs on either side, its descent along this portion being very rapid. The same ponding effect noted above is very pronounced above Beaver Post-office, there being recent meanders and a scarcely perceptible fall. Its total length from head to mouth is 17.0 miles, its total fall 920 feet, and the area of its drainage basin 39.02 square miles. Its principal tributaries in ascending order are Wyatt Run, Little Beaver Creek, Hannah Run, Left Fork, Horse Run, Bearpen Fork, Board Fork, Oldhe Fork, and O'Brien Fork, whose head is the main source of the creek.

Panther Creek.—Panther Creek rises near the Greenbrier Line $3\frac{1}{2}$ miles southwest of Saxman at an elevation of 3000 feet, flows generally northward and empties into Gauley River 2.3 miles southwest from Curtin at an elevation of 1820 feet, its total length being 9.6 miles, its total fall 1180 feet, and the area of its drainage basin 16.88 square miles. Its course is almost entirely through cut-over woodland, its valley being narrow with rugged hillsides on either side, there being only a few farms along the valley and only scanty settlements on the uplands. Its principal tributaries in ascending order are Bear Run, Adkins Lick Run, Geho Run, Jims Branch, North Run, Nettle Run, and Cranes Nest Run.

Cherry River.

Cherry River, a major tributary of Gauley from the south, composed principally of two large branches, North Fork and South Fork, of which the latter rises just north of the Cold

Knob in Greenbrier County at an elevation of 4400 feet and flows northwestward to Richwood where the two forks unite. From Richwood the course of the main stream is northwestward to Curtin where it empties into Gauley River at an elevation of 1910 feet. The total distance from the forks of the river at Richwood to its mouth at Curtin is 10.6 miles and the total fall 284.0 feet, the area of its drainage basin, including both forks, being 171.90 square miles. Throughout its entire course, including its tributary streams, it flows through cut-over woodland, there being a thickly populated industrial community along the valley between Richwood and its mouth but little land devoted to agriculture, and there being some scattered settlements along the uplands. Its principal tributaries in ascending order are Curtin Run, Coal Siding Run, Mill Branch, Morris Creek, Laurel Creek, Little Laurel Creek, South Fork, and North Fork.

The following discharge and gaging records of Cherry River are available, being taken from the various Water-Supply Papers of the U. S. Geological Survey previously quoted under the description of Gauley River:

"Cherry River at Richwood, W. Va.

"This station is located at the highway bridge in the town of Richwood, W. Va. It was established July 3, 1908, to obtain data for use in studying water supply, water power, flood control, and storage problems.

"The datum of the gage has not been changed; the records are reliable and accurate. Sufficient data have not yet been obtained to enable estimates of the flow to be made."

**Discharge measurements of Cherry River at
Richwood, W. Va., in 1908.**

Date	Hydrographer	Width Feet	Area of section Sq. Ft.	Gage height Feet	Dis- charge Sec. Ft.
July 2.....	O'Neill and Chapman	108	176	2.54	54
July 28.....	W. G. Hoyt.....	119	367	4.24	970
September 26 ^a ...	W. M. O'Neill.....	40	25	2.25	8

^aWading measurement.

Daily gage height, in feet, of Cherry River at
Richwood, W. Va., for 1908.

(Observer, Dennis S. Connelly).

Day	July	Aug.	Sept.	Oct.	Nov.	Dec.	Day	July	Aug.	Sept.	Oct.	Nov.	Dec.
1...	.....	2.80	2.50	2.30	2.80	2.48	16..	2.65	2.60	2.20	2.26	2.35	2.84
2...	.....	.....	2.50	2.26	2.73	2.42	17..	2.62	2.50	2.20	2.24	2.35	3.10
3...	2.50	2.70	2.40	2.21	2.66	2.40	18..	2.81	2.55	2.20	2.24	2.39	3.98
4...	2.55	2.65	2.40	2.20	2.50	2.44	19..	2.98	2.50	2.20	2.23	2.54	3.88
5...	3.00	2.70	2.45	2.20	2.46	2.42	20..	2.82	2.50	2.20	2.22	2.66	.....
6...	3.54	2.90	2.45	2.20	.....	2.41	21..	2.76	2.45	2.15	2.22	2.66	.....
7...	3.28	2.80	2.40	2.20	2.41	2.46	22..	3.30	2.45	2.25	2.22	2.55	.....
8...	3.10	2.70	2.35	2.12	2.40	3.25	23..	3.40	2.45	2.30	2.24	2.54	.....
9...	3.02	3.45	2.30	2.12	2.38	.....	24..	3.70	2.40	2.30	2.58	2.51	2.90
10...	2.90	3.05	2.30	2.17	2.37	.....	25..	3.52	2.65	2.20	2.60	2.48	2.90
11...	2.80	2.65	2.30	2.70	2.87	.....	26..	3.22	3.20	2.22	2.53	2.46	3.00
12...	2.70	.....	2.30	2.45	4.00	.....	27..	4.85	2.80	2.21	2.36	2.45	3.00
13...	2.72	.....	2.30	2.36	3.41	.....	28..	4.28	2.70	2.22	2.36	2.45	3.00
14...	2.55	2.70	2.30	2.30	2.34	.....	29..	3.60	3.60	2.32	2.72	2.43	2.80
15...	2.53	2.60	2.25	2.29	2.30	2.88	30..	3.25	2.55	2.32	3.02	2.48	3.00
							31..	3.05	2.50	.....	2.84	.....	3.60

Discharge measurements of Cherry River at
Richwood, W. Va., in 1909.

Date	Hydrographer	Width Feet	Area of section Sq. Ft.	Gage height Feet	Dis- charge Sec. Ft.
March 28.....	H. J. Jackson.....	118	342	4.04	744
March 29.....	H. J. Jackson.....	118	296	3.69	509
November 13....	A. H. Horton.....	112	222	3.00	225

Daily gage height, in feet, of Cherry River at
Richwood, W. Va., for 1909.

(D. S. Connelly and Floyd Artrip, observers).

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	3.30	.....	3.34	3.11	3.71	2.76	3.30	2.40	2.10	2.25	2.52	2.50
2.....	3.10	.....	3.51	3.30	3.58	2.75	3.82	2.42	2.10	2.22	2.50	2.48
3.....	3.00	.....	3.87	3.25	3.36	2.72	3.28	2.35	2.05	2.20	2.48	2.45
4.....	2.90	.....	3.84	3.17	3.22	2.84	3.05	2.30	2.05	2.20	2.42	2.45
5.....	4.50	.....	3.74	3.55	3.12	2.84	2.86	2.28	2.92	2.18	2.40	2.40
6.....	4.30	.....	3.70	3.72	3.00	3.08	3.50	2.25	2.45	2.15	2.40	2.40
7.....	4.21	.....	3.68	3.46	2.92	2.81	3.58	2.35	2.25	2.15	2.40	2.42
8.....	4.20	.....	3.66	3.26	3.30	2.74	3.25	2.28	2.20	2.15	2.40	2.75
9.....	.....	.....	3.90	3.16	3.05	2.82	3.05	2.22	2.22	2.10	3.15	2.45
10.....	3.21	.....	4.12	3.64	3.80	3.16	2.92	2.20	2.72	2.10	3.70	2.45
11.....	3.13	.....	4.57	2.96	3.75	3.28	2.78	2.20	2.82	3.08	3.45	2.45
12.....	3.25	.....	.....	2.92	3.43	3.08	2.70	2.15	2.52	3.20	3.15	2.45
13.....	3.10	3.44	.....	3.05	3.24	2.96	2.82	2.15	2.38	2.70	2.98	3.32
14.....	3.00	3.64	.....	5.16	3.10	2.90	2.82	2.15	2.30	2.60	2.82	3.95
15.....	3.81	4.14	.....	4.00	2.99	3.10	2.68	2.75	2.28	2.55	2.78	3.20
16.....	4.20	4.58	.....	3.42	2.90	3.01	2.60	2.95	2.25	2.60	2.70	2.95
17.....	3.80	3.80	.....	3.25	2.82	2.96	2.58	2.65	2.45	2.58	2.62	2.88
18.....	3.72	3.53	.....	3.12	2.74	3.40	.....	2.52	2.35	2.50	2.58	2.78
19.....	3.71	3.66	.....	3.02	2.66	3.07	2.50	2.48	2.30	2.60	2.55	2.48
20.....	3.50	4.04	.....	3.00	2.64	2.91	2.42	2.40	2.25	2.60	2.50	.....
21.....	.....	3.66	.....	3.18	2.90	2.81	2.40	2.32	2.20	2.52	2.50	.....
22.....	3.39	3.58	.....	3.78	3.15	2.73	2.39	2.30	2.20	2.50	2.50	.....
23.....	3.39	3.48	.....	3.90	2.81	2.72	2.40	2.28	2.25	2.65	2.55	.....
24.....	.....	3.48	.....	3.68	2.72	3.22	2.62	2.25	3.10	3.08	2.62	.....
25.....	.....	3.48	.....	3.55	2.72	3.22	2.58	2.20	2.68	2.88	2.52	.....
26.....	3.24	3.42	.....	3.26	3.30	3.10	2.50	2.20	2.55	2.85	2.50	.....
27.....	.....	3.34	.....	3.15	3.40	2.92	2.48	2.15	2.40	2.82	2.50	.....
28.....	3.00	3.36	4.08	3.38	3.21	2.88	2.65	2.12	2.40	2.78	2.48	.....
29.....	.....	.....	3.66	3.21	3.06	2.92	2.55	2.10	2.35	2.72	2.48	.....
30.....	.....	.....	3.48	3.36	2.92	3.22	2.48	2.10	2.30	2.65	2.55	.....
31.....	.....	.....	3.20	.....	2.82	.....	2.55	2.10	.....	2.60	.....	.....

"NOTE.—Ice conditions December 10 to 31. Ice increased to 0.5 foot during this period. Thickness of ice December 25 was 0.25 foot. Breaks in records, January to March, were due to poor gage reading."

Discharge measurements of Cherry River at
Richwood, W. Va., in 1910.

Date	Hydrographer	Width Feet	Area of section Sq. Ft.	Gage height Feet	Dis- charge Sec. Ft.
March 12.....	A. H. Horton.....	109	185	2.67	138
August 16.....	J. C. Dort.....	105	128	2.27	41.4

Daily gage height, in feet, of Cherry River at
Richwood, W. Va., for 1910.

(Floyd Artrip, observer).

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	.....	2.62	4.55	2.50	2.78	2.60	2.62	2.28	2.48	2.70	2.60	3.05
2.....	3.40	2.62	3.98	2.50	2.68	2.62	2.52	2.27	2.70	2.72	2.65	2.95
3.....	4.58	2.60	3.65	2.50	2.65	2.65	2.50	2.25	2.90	2.58	2.70	2.80
4.....	4.10	2.68	3.40	2.70	2.60	2.62	2.88	2.27	3.22	2.52	2.68	2.72
5.....	3.35	2.62	3.22	2.70	2.55	3.32	2.92	2.27	3.52	2.45	2.60	2.68
6.....	3.15	2.60	3.18	2.65	2.50	3.98	2.70	2.19	3.22	2.40	2.60	2.70
7.....	4.60	.....	3.12	2.65	2.50	3.38	2.78	2.17	3.00	2.45	2.52	2.65
8.....	3.68	.....	2.95	2.65	2.65	3.10	3.10	2.22	2.78	2.95	2.50	2.60
9.....	3.20	2.60	2.85	2.60	2.68	2.95	2.82	2.32	2.90	3.25	2.50	2.58
10.....	2.95	2.75	2.78	2.60	2.70	3.10	2.60	2.27	2.82	2.90	2.45	2.50
11.....	2.90	2.70	2.70	2.55	2.65	3.35	2.58	2.25	2.68	2.72	2.45	2.50
12.....	2.80	.....	2.62	2.62	3.38	3.60	2.50	2.17	2.58	2.68	2.40	2.50
13.....	2.70	.....	2.60	3.08	3.30	3.70	2.92	2.75	2.88	2.58	2.40	2.50
14.....	2.75	.....	2.65	2.88	3.05	3.55	2.82	2.29	2.95	2.50	2.40	.....
15.....	2.70	.....	2.65	2.80	2.88	3.58	2.65	2.22	2.72	2.45	2.40	.....
16.....	2.70	2.85	2.60	2.78	2.78	5.55	2.52	2.27	2.60	2.40	2.38	.. .
17.....	2.65	3.65	2.60	2.98	2.70	4.50	2.52	2.20	2.50	2.40	2.35	.....
18.....	2.88	4.20	2.55	3.25	2.85	3.60	2.65	2.15	2.45	2.38	2.35	.....
19.....	3.80	3.60	2.50	3.05	2.78	3.50	2.70	2.15	2.40	2.32	2.30	2.78
20.....	3.25	3.15	2.50	3.00	2.70	3.20	2.52	2.22	2.40	2.30	2.30	2.72
21.....	4.40	3.05	4.65	3.10	2.92	3.18	2.45	2.15	2.35	2.30	2.28	.....
22.....	3.60	3.50	2.60	3.18	2.88	3.38	2.42	2.50	2.30	2.72	2.25	.....
23.....	3.25	3.30	2.60	3.82	2.80	3.05	2.32	2.28	2.28	2.65	2.20	.....
24.....	3.05	3.05	2.60	3.68	2.75	2.85	2.30	2.20	2.22	2.50	2.30	2.75
25.....	2.88	3.05	2.60	3.42	2.80	2.68	2.22	2.15	4.00	2.40	3.10	3.10
26.....	2.78	2.90	2.60	3.25	2.72	2.58	2.80	2.15	3.40	2.40	2.78	2.80
27.....	2.85	2.85	2.55	3.10	2.62	2.68	2.58	2.15	2.95	2.42	2.68	2.78
28.....	2.80	4.00	2.55	3.05	2.58	3.22	2.50	2.15	3.20	2.85	3.35	2.78
29.....	2.72	.....	2.55	2.95	2.52	2.95	2.40	2.10	2.88	2.68	3.50	4.00
30.....	2.72	.....	2.50	2.85	2.50	2.75	2.40	2.08	2.80	2.62	3.15	5.45
31.....	2.68	.....	2.50	.....	2.50	.....	2.38	2.05	.....	2.60	.....	3.85

"NOTE—Relation of gage height to discharge affected by ice about Jan. 1 to 3, Feb. 6 to 17, and Dec. 10 to 24.

"The following discharge measurement was made by Bailey and Perwien for Cherry River at Richwood, W. Va.:

"October 25, 1911: Gage height, 2.74 feet; discharge, 205 second-feet."

Daily gage height, in feet, of Cherry River at
Richwood, W. Va., for 1911.

(Floyd Artrip, observer).

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	3.85	3.70	2.60	2.73	2.65	3.15	2.22	2.00	2.47	2.35	2.35	2.80
2.....	5.15	3.60	2.60	2.72	2.65	2.62	2.15	1.93	2.23	3.58	2.30	2.72
3.....	4.95	3.30	2.55	3.20	2.60	2.42	2.45	1.87	2.15	3.43	2.28	2.62
4.....	4.02	3.18	2.60	3.78	2.52	2.30	2.15	1.85	2.20	3.08	2.25	2.52
5.....	3.45	3.02	2.50	4.93	2.45	2.90	2.10	2.15	2.60	2.85	2.25	2.45
6.....	3.25	2.88	4.00	3.95	2.40	2.75	2.20	2.30	2.50	2.67	2.95	2.45
7.....	3.00	2.80	3.75	3.50	2.40	2.58	2.42	2.07	2.40	2.95	3.42	2.42
8.....	2.90	2.85	3.32	3.40	2.40	2.50	2.52	2.37	2.25	3.37	3.00	2.42
9.....	2.80	3.00	3.10	3.62	2.40	2.33	2.23	2.13	3.80	3.05	2.82	2.42
10.....	2.75	2.95	3.12	3.27	2.33	2.25	2.15	2.08	2.92	2.85	2.72	2.50
11.....	2.70	2.88	3.30	3.10	2.27	2.28	2.45	2.00	2.83	3.17	2.62	2.52
12.....	3.65	2.80	3.20	3.12	2.30	2.70	2.38	1.95	2.80	3.25	2.70	2.60
13.....	5.88	2.72	3.40	3.32	2.28	2.55	2.23	2.03	2.67	3.05	2.98	2.52
14.....	4.55	2.65	3.30	3.60	2.25	2.43	2.13	2.05	2.60	2.90	2.80	2.50
15.....	4.90	2.62	3.12	3.85	2.20	2.37	2.05	2.10	3.15	3.70	2.78	2.52
16.....	4.20	2.58	3.00	3.30	2.17	2.35	2.08	2.70	3.75	3.47	2.70	2.82
17.....	3.50	2.50	2.90	3.15	2.20	2.30	2.18	2.25	3.13	3.55	2.60	2.90
18.....	3.25	2.55	2.85	3.00	2.20	2.40	2.17	2.10	2.80	4.75	3.18	2.78
19.....	3.05	2.70	3.12	2.95	2.20	2.40	2.07	2.03	2.70	3.72	3.15	2.65
20.....	2.90	2.62	3.65	3.65	2.15	2.40	2.00	2.00	2.65	3.30	2.95	2.60
21.....	3.05	2.50	3.25	3.47	2.10	2.30	2.02	2.00	2.53	2.97	2.88	2.60
22.....	3.62	2.60	3.10	3.50	2.10	2.22	2.10	1.93	2.57	2.92	2.75	2.62
23.....	2.42	2.60	3.25	3.52	2.10	2.20	2.05	1.90	2.40	3.00	2.62	3.30
24.....	3.20	2.50	2.98	3.25	2.85	2.17	2.10	1.85	2.25	2.88	2.70	3.10
25.....	3.02	2.50	2.88	3.17	2.40	2.27	2.30	1.90	2.28	2.67	2.78	3.10
26.....	3.50	2.50	2.75	3.00	2.27	2.30	2.20	2.00	2.23	2.62	2.65	3.10
27.....	3.70	2.65	3.23	2.92	2.28	2.40	2.10	1.93	2.17	2.52	2.62	3.50
28.....	3.85	2.75	2.98	2.82	2.20	2.62	2.03	1.87	2.57	2.48	2.72	3.28
29.....	3.98	.....	2.90	2.80	2.18	2.33	2.00	2.07	2.58	2.45	3.05	3.05
30.....	5.95	.....	3.00	2.67	2.17	2.23	1.95	2.25	2.48	2.40	2.88	2.90
31.....	3.85	.....	2.83	.....	2.70	.....	2.00	2.65	.....	2.38	.....	3.35

"NOTE.—Feb. 22 observer reported 'Ice in shoals.' Relation of gage height to discharge probably not materially affected by ice during 1911.

"The following discharge measurement was made by C. T. Bailey, for Cherry River at Richwood, W. Va.:

"March 20, 1912: Gage height, 4.35 feet; discharge, 1,270 second feet."

Daily gage height, in feet, of Cherry River at
Richwood, W. Va., for 1912.

(Floyd Artrip, observer).

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	3.3	2.95	3.0	3.2	3.1	2.18	2.28	2.62	2.60	2.40	2.38	2.22
2.....	3.05	2.75	2.85	3.7	2.98	2.15	2.22	2.50	2.50	2.36	2.43	2.32
3.....	2.92	2.72	2.75	3.7	2.90	2.18	2.20	2.42	2.43	2.33	2.36	2.82
4.....	2.80	2.60	2.62	3.85	2.78	2.12	2.38	2.35	2.60	2.28	2.30	2.79
5.....	2.58	2.65	2.58	3.2	2.70	2.10	2.50	2.28	2.40	2.23	2.28	3.05
6.....	.....	2.70	2.50	3.0	2.65	2.05	2.32	2.22	2.36	2.23	2.28	3.25
7.....	.....	2.70	2.50	3.1	3.4	2.10	2.22	2.20	2.28	2.20	4.6	3.2
8.....	.....	.....	2.50	3.15	3.35	2.02	2.18	2.15	2.20	2.18	4.1	3.05
9.....	.....	.....	2.75	3.0	3.15	1.98	2.25	2.15	2.16	2.16	3.4	2.82
10.....	.....	.....	2.70	2.95	3.0	1.95	2.50	2.30	2.13	2.13	3.05	2.72
11.....	.....	.....	2.65	2.78	2.95	1.90	3.2	2.30	2.08	2.08	2.89	2.67
12.....	2.48	.....	2.70	2.70	5.0	1.90	2.78	2.42	2.06	2.08	2.75	2.52
13.....	2.38	.....	3.4	2.62	4.0	1.90	2.55	2.38	2.00	2.06	2.67	2.47
14.....	2.35	.....	3.1	2.60	3.55	1.90	2.60	2.25	1.98	2.10	2.72	2.52
15.....	2.30	2.25	6.2	2.58	3.35	1.88	3.3	2.12	1.98	2.08	2.65	2.47
16.....	.....	2.25	4.6	2.82	6.0	1.92	3.15	2.08	2.08	2.08	2.55	2.42
17.....	.....	2.22	3.7	2.70	4.5	2.20	2.75	2.05	2.10	2.03	2.52	2.37
18.....	2.40	2.32	3.5	2.98	3.55	2.40	2.80	2.05	2.08	2.03	2.47	2.37
19.....	2.85	2.38	3.6	2.85	3.3	2.78	3.0	2.45	2.20	2.63	2.47	2.39
20.....	3.05	2.68	4.4	2.78	3.05	2.65	2.75	2.55	2.10	2.66	2.45	2.29
21.....	2.75	3.7	4.0	2.70	2.88	2.35	2.60	2.45	2.06	2.46	2.42	2.27
22.....	2.70	3.9	3.85	2.75	2.78	2.25	2.60	2.65	1.98	2.38	2.37	2.29
23.....	2.60	3.3	3.35	2.88	2.68	2.72	2.50	2.48	3.05	3.1	2.37	2.35
24.....	2.60	3.1	4.0	2.80	2.58	2.38	2.40	2.30	5.4	2.70	2.32	2.27
25.....	2.50	2.92	3.8	2.72	2.50	2.05	4.10	2.26	3.05	2.66	2.32	2.32
26.....	2.50	4.6	3.45	2.68	2.48	2.62	3.55	2.28	2.76	2.63	2.27	2.42
27.....	2.45	4.4	3.15	2.85	2.38	2.52	3.1	2.40	2.76	2.63	2.27	2.37
28.....	2.45	3.55	3.0	3.4	2.32	2.65	2.80	2.28	2.63	2.58	2.25	2.37
29.....	2.70	3.25	4.8	2.85	2.30	2.42	2.80	3.65	2.53	2.53	2.19	2.39
30.....	3.5	.....	3.9	3.2	2.25	2.32	2.88	3.1	2.48	2.48	2.22	3.25
31.....	3.1	.....	3.45	.....	2.20	.....	2.68	2.76	.....	2.40	.....	3.4

“NOTE.—Relation of gage height to discharge probably affected by ice about Jan. 6-12, 16-18, and Feb. 5-17. Observer reported as follows: Jan. 6-11, river frozen over; Jan. 12, ice thawed out; Jan. 16 and 17, river frozen; Jan. 18, thawing; Feb. 8-14, river frozen; and Feb. 15, ice thawing out.”

Daily gage height, in feet, of Cherry River at Richwood,
W. Va., for the year ending Sept. 30, 1913.

(Floyd Artrip, observer).

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	2.40	2.38	2.22	3.05	3.05	3.2	2.94	2.97	3.45	2.76	2.19	2.12
2.....	2.36	2.43	2.32	2.92	2.98	3.05	2.84	2.90	3.15	2.39	2.39	2.04
3.....	2.33	2.36	2.82	3.05	3.15	2.86	2.71	2.77	2.90	3.1	2.26	2.04
4.....	2.28	2.30	2.79	3.05	3.6	2.76	2.68	2.65	2.90	2.84	2.16	2.04
5.....	2.23	2.28	3.05	2.95	3.25	2.74	2.61	2.57	2.70	2.49	2.12	1.99
6.....	2.23	2.28	3.25	3.65	3.0	2.68	2.61	2.55	2.60	3.8	2.06	1.94
7.....	2.20	4.6	3.2	5.1	2.88	2.51	2.56	2.55	2.87	2.96	2.04	1.96
8.....	2.18	4.1	3.05	5.1	2.91	2.51	2.51	2.45	3.05	2.66	2.04	2.06
9.....	2.16	3.4	2.82	4.0	2.81	2.54	2.46	2.40	2.95	2.52	1.99	2.19
10.....	2.13	3.05	2.72	3.5	2.66	2.66	2.46	2.35	2.77	3.3	1.99	2.04
11.....	2.08	2.89	2.67	3.35	2.94	3.75	2.48	2.30	2.67	2.86	1.96	1.94
12.....	2.08	2.75	2.52	3.5	3.35	3.4	3.0	2.30	2.57	2.72	2.22	1.94
13.....	2.06	2.67	2.47	3.3	3.0	3.25	3.0	2.25	2.47	2.59	2.76	1.94
14.....	2.10	2.72	2.52	3.1	2.91	4.8	2.96	2.25	2.40	2.49	2.52	1.94
15.....	2.08	2.65	2.47	2.95	2.76	3.9	4.6	2.27	2.55	3.0	2.26	1.94
16.....	2.08	2.55	2.42	2.85	2.66	3.55	3.6	2.43	2.30	2.82	2.22	1.89
17.....	2.03	2.52	2.37	2.75	2.61	3.2	3.25	3.05	2.25	2.59	2.14	2.21
18.....	2.03	2.47	2.37	2.72	2.51	2.98	3.05	2.93	2.20	2.52	2.04	2.45
19.....	2.63	2.47	2.39	2.67	2.48	2.84	2.95	2.75	2.15	4.6	2.69	2.21
20.....	2.66	2.45	2.29	2.62	2.66	2.76	2.83	2.63	2.13	3.75	2.82	2.13
21.....	2.46	2.42	2.27	2.79	2.91	2.74	2.70	2.67	2.15	3.05	2.49	3.8
22.....	2.38	2.37	2.29	2.77	3.2	2.68	2.65	2.65	2.20	2.76	3.25	3.1
23.....	3.1	2.37	2.35	2.75	3.15	2.58	2.57	3.45	2.45	2.64	3.65	2.68
24.....	2.70	2.32	2.27	3.3	2.98	2.56	2.55	3.95	2.27	2.64	2.89	2.48
25.....	2.66	2.32	2.32	3.35	2.76	2.56	2.50	3.3	2.25	3.1	2.66	2.33
26.....	2.63	2.27	2.42	3.2	2.74	2.84	2.47	3.05	3.05	2.72	2.54	2.25
27.....	2.63	2.27	2.37	3.1	2.88	5.7	3.05	4.6	2.57	2.56	2.39	2.23
28.....	2.58	2.25	2.37	2.91	3.5	3.9	3.05	4.5	2.45	2.44	2.29	2.28
29.....	2.53	2.19	2.39	2.78	.....	3.45	3.1	3.6	2.33	2.29	2.24	2.13
30.....	2.48	2.22	3.25	2.68	.....	3.2	3.25	3.35	2.25	2.29	2.19	2.21
31.....	2.40	.....	3.4	2.78	.....	3.05	.....	4.4	.....	2.24	2.14	.....

"NOTE.—Observer made no notes concerning ice. Discharge relation probably affected by ice about Feb. 8 to 18, 1913."

Discharge measurements of Cherry River at Richwood,
W. Va., during the year ending Sept. 30, 1914.

Date	Made by	Gage height Feet	Dis- charge Sec. Ft.
December 2.....	Peterson and Walters.....	3.89	916
December 2.....	Peterson and Walters.....	3.85	894

Daily gage height, in feet, of Cherry River at Richwood,
W. Va., for the year ending Sept. 30, 1914.

(Floyd Artrip, observer).

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	2.23	2.61	3.35	2.65	3.6	2.65	3.65	2.77	2.01	1.66	1.75	2.12
2.....	2.23	2.53	3.9	2.58	3.2	3.7	4.1	2.67	2.01	1.76	1.75	2.04
3.....	2.98	2.45	3.35	2.62	3.0	3.45	3.7	2.57	1.96	1.94	1.75	2.04
4.....	2.83	2.43	3.15	2.60	2.88	3.35	3.25	2.57	1.96	1.84	1.73	1.96
5.....	2.58	2.38	2.95	2.50	2.88	2.68	3.05	2.77	2.01	1.86	1.75	1.94
6.....	2.45	2.33	2.75	2.48	2.85	2.48	2.88	3.4	2.04	1.81	1.75	1.89
7.....	2.41	2.33	3.05	2.45	3.1	2.46	2.80	3.1	1.96	1.76	1.73	1.89
8.....	2.33	2.35	3.1	2.45	3.0	2.43	3.85	2.97	1.96	1.74	1.87	1.89
9.....	2.28	2.93	2.98	2.75	2.82	2.38	3.55	2.87	1.91	2.26	1.90	1.84
10.....	2.43	2.73	2.80	2.95	2.80	2.43	3.2	2.77	1.88	1.96	2.15	1.84
11.....	2.41	2.68	2.75	2.80	2.70	2.48	3.0	2.69	1.86	1.86	2.00	1.86
12.....	2.53	2.68	2.68	2.72	2.70	2.40	2.90	2.62	1.86	1.81	2.37	2.06
13.....	2.43	2.93	2.60	2.80	2.60	2.4	2.76	2.59	1.91	1.75	2.27	2.02
14.....	2.35	4.3	2.55	2.70	2.60	2.40	2.68	2.55	1.86	2.35	2.07	1.94
15.....	2.33	5.1	2.52	2.70	2.62	2.73	3.0	2.47	1.84	2.27	1.95	1.86
16.....	2.31	5.0	2.50	2.60	2.58	3.35	4.5	2.42	1.78	2.13	1.90	1.84
17.....	2.25	3.55	2.50	2.52	2.58	3.8	3.65	2.37	1.76	2.05	1.85	1.82
18.....	2.38	3.3	2.55	2.48	2.60	3.65	3.25	2.35	1.74	2.07	1.80	1.79
19.....	2.43	3.2	2.52	2.50	3.9	3.25	3.05	2.32	1.71	1.95	1.75	1.74
20.....	3.3	2.98	2.50	3.0	3.9	3.0	3.7	2.27	1.78	1.87	1.75	1.74
21.....	3.15	2.85	2.50	4.4	3.25	2.90	3.5	2.27	1.81	1.85	2.25	1.74
22.....	2.93	2.71	2.50	3.5	3.0	2.76	3.2	2.22	1.81	1.80	2.10	1.74
23.....	3.1	2.63	2.50	3.15	3.0	2.68	3.0	2.22	1.81	1.75	1.95	1.74
24.....	4.1	2.53	2.60	3.1	2.90	2.70	2.87	2.17	1.88	1.75	1.97	1.74
25.....	4.3	2.51	2.60	4.0	2.75	3.2	2.77	2.15	1.88	1.75	2.27	1.79
26.....	4.6	2.43	3.3	3.4	2.70	4.4	4.2	2.12	1.91	1.85	2.96	1.84
27.....	3.65	2.43	3.0	3.2	2.70	4.4	3.55	2.07	1.84	2.23	2.54	1.79
28.....	3.2	3.1	2.85	3.1	2.62	4.7	3.2	2.05	1.78	2.00	2.29	1.74
29.....	2.98	3.2	2.78	3.45	.....	4.1	3.0	2.01	1.76	1.90	2.44	1.74
30.....	2.81	2.98	2.72	3.7	.....	4.1	2.87	2.11	1.71	1.85	2.29	1.74
31.....	2.71	.....	2.68	4.6	.....	4.0	.....	2.06	.....	1.83	2.22	.....

"NOTE.—Discharge relation probably affected by ice Jan. 13-18, Feb. 14-18, and Mar. 1-13.

"The following discharge measurements were made by wading, by J. G. Mathers for Cherry River at Richwood, W. Va.:

"November 22, 1914: Gage height, 2.29 feet; discharge, 66 second-feet. Gage height, 2.27 feet; discharge, 64 second-feet."

Daily gage height, in feet, of Cherry River at Richwood,
W. Va., for the year ending Sept. 30, 1915.

(Floyd Artrip, observer).

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	1.69	2.32	2.95	2.92	4.2	2.68	2.50	2.85	2.58	2.00	2.13	2.27
2.....	1.69	2.30	3.0	2.78	5.5	2.68	2.50	2.72	2.53	2.38	2.33	2.17
3.....	1.69	2.28	3.0	2.70	4.4	2.52	2.50	2.85	2.63	2.13	2.96	2.22
4.....	1.64	2.20	2.88	2.60	3.55	2.45	2.45	2.78	2.86	2.10	2.53	2.42
5.....	1.74	2.20	4.8	2.52	3.3	2.45	2.48	2.72	2.70	2.78	2.30	2.97
6.....	2.04	2.18	3.45	3.5	3.3	2.50	2.78	2.60	2.56	2.56	2.18	2.79
7.....	1.94	2.15	3.1	5.5	3.05	2.48	3.25	2.58	2.46	2.28	2.13	2.57
8.....	1.86	2.10	2.95	3.75	2.88	2.40	3.20	2.50	2.48	2.40	2.08	2.47
9.....	1.92	2.15	2.85	3.4	2.72	2.40	3.20	2.45	2.38	2.60	2.06	2.37
10.....	1.95	2.10	2.80	2.98	2.68	2.38	3.10	2.38	2.33	2.36	2.00	2.27
11.....	1.93	2.10	2.65	2.85	2.62	2.50	3.0	2.30	2.28	2.28	2.38	2.22
12.....	1.85	2.10	2.60	3.2	2.60	2.40	2.98	2.32	2.18	2.23	2.50	2.17
13.....	1.88	2.05	2.55	2.90	2.68	2.45	2.85	2.38	2.10	2.16	2.28	2.12
14.....	2.23	2.05	2.52	2.78	3.35	2.35	2.75	2.28	2.76	2.10	2.18	2.15
15.....	2.28	2.30	2.78	3.0	4.7	2.52	2.60	2.20	2.60	2.03	2.43	2.05
16.....	3.05	2.82	2.50	2.98	3.8	2.60	2.50	2.20	2.46	2.03	2.28	1.97
17.....	2.61	2.70	2.55	3.7	3.3	2.62	2.48	2.15	2.36	2.58	2.60	1.89
18.....	2.48	2.50	2.52	5.0	3.0	2.38	2.45	2.10	2.48	2.76	3.50	1.99
19.....	2.31	2.45	2.50	4.8	2.85	2.45	2.40	2.10	2.36	2.40	2.80	2.42
20.....	2.23	2.40	3.2	3.6	2.70	2.45	2.38	2.12	2.20	3.16	2.56	2.27
21.....	2.15	2.38	3.35	3.2	2.62	2.38	2.35	2.22	2.13	3.26	2.63	2.92
22.....	2.16	2.30	3.4	2.9	2.60	2.32	2.30	2.12	2.08	2.90	2.76	2.75
23.....	2.15	2.20	3.0	2.85	2.60	2.30	2.32	2.12	2.03	2.63	2.68	2.42
24.....	2.25	2.10	2.85	2.92	4.1	2.30	2.32	2.15	1.98	2.56	2.53	2.35
25.....	2.70	2.20	2.72	2.82	3.5	2.30	2.30	2.12	1.93	2.33	2.46	2.25
26.....	2.48	2.15	2.60	2.75	3.1	2.62	2.28	2.25	1.88	2.23	2.33	2.17
27.....	2.38	2.15	2.68	2.65	2.9	2.50	2.22	2.45	1.88	2.16	2.26	2.29
28.....	2.30	2.12	2.70	2.52	2.85	2.55	3.2	2.28	1.83	2.08	2.46	2.53
29.....	2.28	2.10	2.70	2.40	.....	2.58	3.6	2.25	1.78	2.03	2.66	2.39
30.....	2.30	2.40	3.6	2.42	.....	2.60	3.1	2.80	1.80	2.03	2.43	2.29
31.....	2.40	.....	3.15	2.42	.....	2.55	.....	2.75	.....	2.08	2.36	.....

"NOTE.—River partly frozen over Dec. 15-17.

"The following discharge measurements were made by B. E. Jones, for Cherry River at Richwood, W. Va.:

"September 5, 1916: Gage height, 1.84 feet; discharge, 13.6 second-feet, and 13.7 second-feet."

**Daily gage height, in feet, of Cherry River at Richwood,
W. Va., for the year ending Sept. 30, 1916.**

(Floyd Artrip, observer).

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	7.17	2.02	2.51	3.51	3.78	2.73	3.07	2.65	2.54	2.19	2.26	1.89
2.....	4.35	2.02	2.46	3.91	3.41	2.75	2.93	2.57	2.42	2.49	2.99	1.92
3.....	3.52	1.97	2.41	3.38	3.11	2.65	2.83	2.53	2.82	2.64	2.59	1.94
4.....	3.15	1.97	2.36	3.01	2.94	2.53	2.73	2.77	2.69	2.34	2.64	1.86
5.....	2.97	1.97	2.31	2.88	2.78	2.55	2.65	2.65	2.54	2.16	2.82	1.82
6.....	2.77	1.97	2.26	2.86	2.76	2.57	2.65	2.57	2.54	2.09	2.64	1.90
7.....	2.57	1.97	2.26	2.81	3.04	4.35	2.57	2.57	2.89	2.04	2.82	1.82
8.....	2.49	1.97	2.26	2.68	2.91	3.95	2.57	2.53	2.86	1.96	2.89	1.88
9.....	2.39	1.97	2.18	2.76	2.88	3.43	2.55	2.90	2.92	1.99	3.94	2.08
10.....	2.37	1.97	2.16	2.71	2.91	3.17	2.50	2.67	2.84	2.00	3.39	1.92
11.....	2.29	1.87	2.16	4.21	2.84	2.77	2.90	2.57	2.69	2.46	2.99	1.80
12.....	2.25	1.97	2.16	4.16	2.86	2.73	4.00	2.47	2.54	2.16	3.24	1.78
13.....	2.19	2.13	2.16	4.06	3.38	2.70	3.73	2.42	2.44	2.06	3.06	1.75
14.....	2.17	2.09	2.06	3.56	3.21	3.85	3.33	2.35	2.34	2.04	2.96	1.80
15.....	2.17	3.32	2.08	3.24	3.18	3.95	3.10	2.30	2.94	2.04	2.76	5.15
16.....	2.12	3.05	2.18	3.01	2.91	3.35	2.93	2.33	3.19	3.09	2.92	3.32
17.....	2.07	2.82	2.51	2.74	2.68	3.05	2.87	2.33	3.44	3.72	2.89	2.82
18.....	2.07	2.72	5.76	2.61	2.64	2.95	2.73	2.30	2.96	3.04	2.69	2.58
19.....	2.55	3.49	3.76	2.66	2.58	2.87	2.62	2.23	2.76	2.74	2.56	2.33
20.....	2.47	3.29	3.36	2.64	2.51	2.75	2.57	2.15	2.76	2.86	2.72	2.30
21.....	2.37	3.02	2.91	2.78	2.66	2.85	2.55	2.15	2.66	3.02	2.46	2.25
22.....	2.29	2.87	2.76	3.21	2.66	4.10	2.67	2.10	2.56	3.79	2.59	2.12
23.....	2.25	2.75	2.66	3.36	2.78	3.85	2.55	2.53	2.42	4.04	2.72	2.10
24.....	2.17	2.65	2.56	3.06	3.26	3.33	2.50	2.70	2.39	3.32	2.46	2.08
25.....	2.17	2.55	2.71	2.88	3.86	3.15	3.00	2.47	2.96	2.82	2.34	2.00
26.....	2.15	2.47	2.81	2.76	3.31	3.05	3.15	2.65	2.74	2.64	2.22	1.95
27.....	2.15	2.89	2.71	2.78	3.04	3.27	3.15	2.45	2.54	2.56	2.14	1.90
28.....	2.09	2.82	2.81	2.71	2.86	3.57	3.03	2.40	2.42	2.92	2.06	1.90
29.....	2.07	2.72	5.71	2.86	2.74	3.50	2.87	2.30	2.32	2.56	2.01	3.75
30.....	2.07	2.59	4.06	3.56	.....	3.23	2.77	2.85	2.19	2.42	1.99	2.90
31.....	2.07	.....	3.38	3.26	.....	3.20	.....	2.80	.....	2.29	1.94	.....

Laurel Creek.—Laurel Creek rises in Greenbrier County just north of the Cold Knob at an elevation of 4400 feet, flows northwestward to the Nicholas Line, and thence northward to Fenwick where it empties into main Cherry River at an elevation of 2075 feet, its total length from head to mouth being 10.3 miles, its total fall 2325 feet, and the area of its drainage basin 40.02 square miles, of which approximately two-thirds is within the bounds of Greenbrier County. Its course is almost entirely through cut-over woodland, the valley being narrow with steep and rugged mountainsides on either flank, but along that portion in Nicholas County there is a considerable mining community. Its principal tributaries

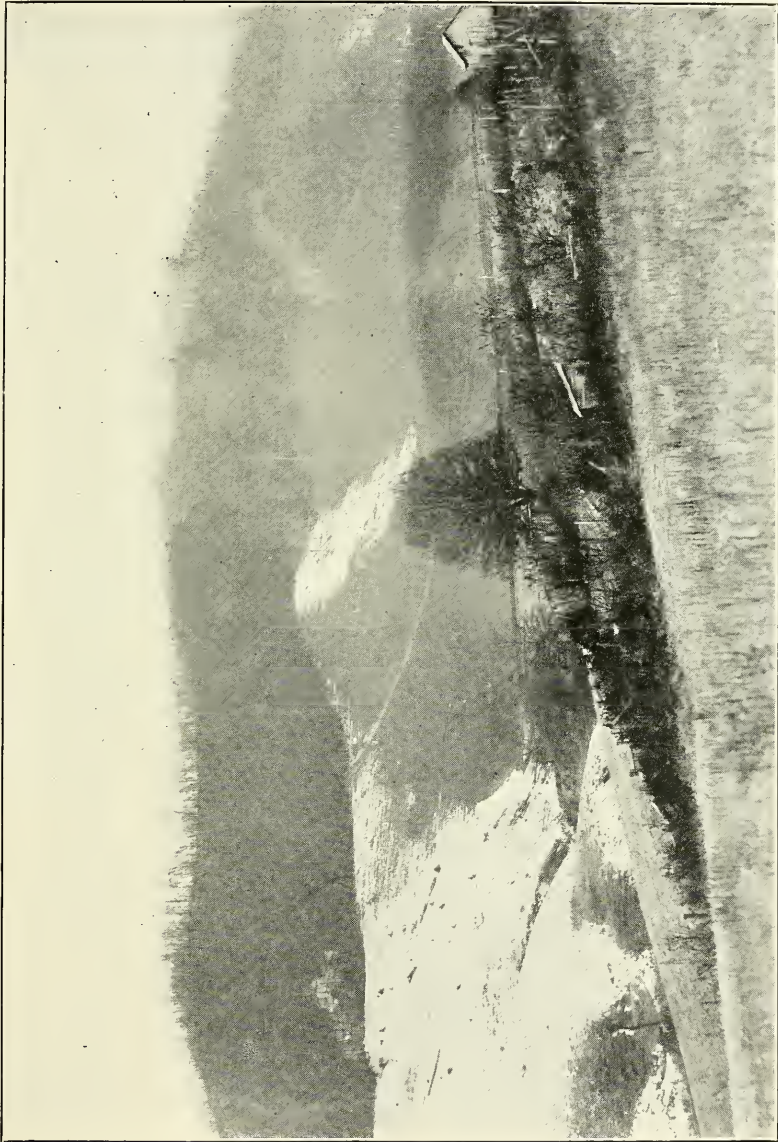


Photo by E. E. Harris.

PLATE IV.— Looking west from Summersville High School; Lonetree Mountain in background, capped by remnant of Allegheny Series, with Kanawha sediments in lower portion; quarry in Monitor Sandstone visible in middle and Eagle Coal mine in ravine at left center.



in Nicholas County are Turkey Run, Road Run, Niggerspring Run, Nixon Branch, and Pack Fork; and in Greenbrier County, McMillion Creek, Beech Run, Middle Branch, Job Knob Fork, and Coldspring Branch.

Little Laurel Creek.—Little Laurel Creek rises near the Manning Knob in Greenbrier County at an elevation of 4000 feet, flows by generally northward course for 5 miles, then veers sharply northwestward and empties into main Cherry River at the western edge of Richwood at an elevation of 2125 feet, its total length being 10.2 miles, its total fall 1875 feet, and the area of its drainage basin 16.20 square miles, of which the major portion is in Greenbrier County.

South Fork of Cherry River.—South Fork, as mentioned above under the description of the parent stream, rises near the Cold Knob in Greenbrier County at an elevation of 4400 feet, flows by general northward course to Richwood where it unites with North Fork to form main Cherry River at an elevation of 2195 feet, its total length being 14.2 miles, its total fall 2205 feet, and the area of its drainage basin 55.65 square miles, of which the major portion is in Greenbrier County and the remainder in Nicholas. Its course is almost entirely through cut-over woodland, there being only a few settlers along its lower valley. Its principal tributaries are Briery Run, Beech Lick Run, Big Rocky Run, Blizzard Run, Becky Run, Blueknob Branch, and Cold Knob Fork, whose head is the main source of the stream, all of them emptying within the bounds of Greenbrier County.

North Fork of Cherry River.—North Fork of Cherry River rises in Pocahontas County about one mile west of the Kennison Mountain and $3\frac{1}{2}$ miles southeast of Dogway village, at an elevation of 4400 feet, flows generally northwestward across northern Greenbrier and into Nicholas, uniting with South Fork at Richwood to form main Cherry River, at an elevation of 2195 feet, its total length being 17.0 miles, its total fall 2205 feet, and the area of its drainage basin 36.39 square miles, of which the major portion is in Nicholas and Greenbrier Counties. Its course is entirely through cut-over woodland, the valley being narrow, with steep and rugged mountainsides on either flank, there being a small area of glade land near its source and only a few mining and railroad

settlements on its lower course. Its principal tributaries in ascending order are Spencer Run, Desert Branch, Hunter Branch, Hanging Rock Branch, and Bear Creek.

Cranberry River.

Cranberry River, another major tributary of Gauley from the south, rises in Pocahontas against the Cranberry and Black Mountains, 6 miles west of Marlinton, the elevation of its source being 4600 feet. It flows northwestward into Webster, crossing the county line at an elevation of 2985 feet, and continues with the same general course for 10 miles farther, after which it veers to the southwest, crossing into Nicholas at an elevation of 2210 feet, and empties into the Gauley at Cranberry Station, its elevation at that point being 1920 feet, making a total fall of 2680 feet. Its total length from head to mouth is 32 miles, that portion in Webster being 13.2 miles, and that portion in Nicholas, 7.1 miles. The area of its drainage basin is 74.08 square miles. Almost its entire watershed is covered with forest, most of which, except near the source, has been cut over in recent years. Throughout most of its length it is a swift and shallow stream, with steep mountains on either side and only a few short stretches of bottom lands. Its principal tributaries in ascending order are Jakeman Run, Barrenshe Run, Dogway Fork, and North Fork.

Elk River Tributaries.

Several important tributaries of Elk River have their source along the general watershed which closely parallels the northwestern border of the county for several miles. Among these may be noted **Sycamore Creek**, heading northeast of Vaughan, and emptying into Elk at Big Sycamore; **Leatherwood Creek**, heading northeast of Harriet and emptying into Elk at Upper Leatherwood; **Buffalo Creek**, heading against Powell Mountain, and emptying into Elk at Dundon; **Strange Creek**, heading against the Powell Mountain, and emptying into Elk River at Strange Creek Station.

Birch River.

Birch River, a major tributary of Elk, rises in Webster County just northwest of Cowen, flows northwestward across the northern edge of Nicholas County, and empties into Elk River at Glendon, Braxton County. Its total length from head to mouth is 38.6 miles, of which 12.4 miles are in Webster, 9.5 miles in Nicholas, and 16.7 miles in Braxton. The elevation at its source is 2550 feet, at the Webster-Nicholas Line, 1255 feet, at the Nicholas-Braxton Line 980 feet, and at Glendon 775 feet, making a total fall of 1775 feet from head to mouth. The area of its entire drainage basin is 140.6 square miles, and of that portion above and including Skyles Creek 26.6 miles, and of that portion above but not including Little Birch River 76.93 square miles. Through most of its course it is a swift shallow stream flowing between steep slopes and having only narrow bottom lands and no recent meanders. Wide meanders, inherited from the time of the supposed Cretaceous peneplain are very numerous. Its principal tributaries in Braxton County in ascending order are Leatherwood Run, Diatter Run, Middle Run, Long Run, and Little Birch River; and in Nicholas County, Mill Creek (on the south), Powell Creek, Mill Creek (on the north), Anthony Creek, and Poplar Creek; and in Webster County, Skyles Creek and Barnet Run.

Powell Creek.—Powell Creek rises in Hamilton District, $3\frac{1}{4}$ miles northwest of Tioga at an elevation of 2500 feet, flows westward to the base of the Powell Mountain, and thence northward to Birch River village, where it empties into Birch River at an elevation of 1100 feet, its total length being 9.1 miles, its total fall 1400 feet, and the area of its drainage basin 9.58 square miles. Its principal tributaries in ascending order are Little Run, Lick Run, Shant Branch, Rich Fork, and Tug Fork, whose head is the source of the main stream. Its course is mainly through virgin and cut-over woodland, there being a small amount of farming land along its lower valley.

Mill Creek.—Mill Creek (on the north) rises about one mile southwest of Waggy, at an elevation of 1800 feet, flows

generally southwestward, and empties into Birch River at Birch River village at an elevation of 1100 feet, its total length being 4.4 miles, its total fall 700 feet, and the area of its drainage basin being 5.87 square miles. A considerable portion of its course is through cut-over woodland, there being a fair proportion of cleared land.

Anthony Creek.—Anthony Creek rises $3\frac{1}{2}$ miles west of Tioga at an elevation of 2050 feet, flows northward, and empties into Birch River 1.2 miles above Birch River village at an elevation of 1130 feet, its total length being 5.8 miles, its total fall 920 feet, and the area of its drainage basin 8.91 square miles. Almost its entire course is through virgin or cut-over woodland, there being only a few cleared farms along its lower valley. Its principal tributaries in ascending order are Kettle Run, Lower Cabin Run, Rich Fork, Road Fork, and Rockhouse Run, whose head is the main source of the parent stream.

Poplar Creek.—Poplar Creek rises $1\frac{1}{4}$ miles north of Tioga at an elevation of 2325 feet, flows northwestward and empties into Birch River 1.8 miles east of Birch River village at an elevation of 1150 feet, its total length being 6.5 miles, its total fall 1175 feet, and the area of its drainage basin 7.51 square miles. Its course is mainly through virgin or cut-over woodland, there being a few cleared farms along its lower valley.

TOPOGRAPHIC FEATURES.

In its general features the topography of Nicholas differs little from that of other counties in the central portion of the State. Besides the deep valley of Gauley River which extends entirely across the county there is a constant succession of long creeks and tributary streams that have cut into the old peneplain of supposed Cretaceous age until only ridges remain. North of the Gauley, sharp ridges and V-shaped valleys are the rule near the head of each principal creek or tributary, but within a few miles of its head the valley almost invariably widens to the U-shape and so remains until the stream begins its rapid descent over the hard rocks that outcrop along its

lower course. Here the valley changes to the V-shape again, and plateaus are noticeable in contrast with the sharp ridges of its upper course. South of the Gauley, V-shaped valleys are general, the course of the streams not having been retarded by the ponding effect of sandstones noticeable on the north side. The major drainage streams have cut fairly normal channels from head to mouth, but the smaller tributaries that empty directly into the Gauley are generally less rapid in their upper courses and usually plunge steeply over the hard rocks of the New River Group in the last half-mile. Broad ridges of plateau-like character are the rule, there being occasional monadnocks rising to a higher level. The height of the ridges throughout the county is variable, ranging from 300 to 1000 feet, and there is a variety of slopes, their angles ranging from 10 to 30 degrees.

Owing to the absence of violent orogenic disturbance there are no prominent mountain scarps, such as may be seen in Greenbrier, Pocahontas, Randolph, and other neighboring counties where the uplifts have been more severe. The slopes in the main are symmetrical between adjoining tributaries.

RIVER TERRACES.

Evidence of former drainage levels higher than the present channel of Gauley is abundant, both along this river and on its tributary streams. The following table gives in condensed form the locations and other data concerning the terrace deposits of Gauley River and its tributaries, as observed by Dr. Price and the writer:

Terrace Deposits Along Gauley River and Tributaries.

Gauley River or near-by points below Carnifex Ferry:	Tidal Eleva- tion. Top.	Thick- ness. Feet.	Height of top above Gauley	Name of Terrace.
1.3 miles northwest of Marvel (boulders)	825	....	25	First
Twentymile, 0.5 mile northeast of Belva.	765	....	90	Second
1.1 miles northwest of Albion.....	1265	....	315	Third
1.1 miles northeast of Albion.....	1380	....	355	Third
Meadow Creek, 0.5 mile north of Keslers Cross Lanes.....	1655	....	455	Fourth

Peters Creek and Tributaries:	Tidal Eleva- tion. Top.	Thick- ness. Feet.	Height of top above Peters Creek.	Height of top above Gauley at mouth of Peters Creek.	Name of Terrace.
1.3 miles south of Lockwood.....	1115	....	115	215	Third
0.4 mile east of Lockwood.....	1110	....	60	210	Third
1.5 miles northeast of Lockwood..	1135	....	70	235	Third
0.8 mile southwest of Drennen.	1160	....	90	260	Third
Zela	1340	10	90	440	Fourth
Jerry Fork, 2 miles northeast of Drennen	1415	....	255	515	Fifth
Hutchinson Branch, 0.9 mile north of Gilboa	1425	....	125	525	Fifth

Muddlety Creek and Tributaries:	Tidal Elevation. Top.	Thickness. Feet.	Height of top above Muddlety.	Height of top above Gauley at mouth of Muddlety.	Name of Terrace.
Arbuckle Branch, 0.3 mile southeast of Summersville.....	1860	10	240	290	Third
2.7 miles north of Summersville (pebbles)	1855	....	25	285	Third
Glade Creek, 1.7 miles southeast of Kirkwood	1930	....	130	360	Third
0.6 mile south of Muddlety (pebbles)	1845	....	10	275	Third
0.6 mile southwest of Hookersville	1875	10	25	305	Third
0.8 mile northeast of Hookersville	1880	8	25	310	Third
2½ miles northward from Calvin.	2220	....	....	650	Fifth

Summarized in compact form these observations reveal the five following terraces:

First Gauley River Terrace	25 to 30 feet above the river.
Second Gauley River Terrace	90 to 100 feet above the river.
Third Gauley River Terrace	210 to 315 feet above the river.
Fourth Gauley River Terrace	435 to 460 feet above the river.
Fifth Gauley River Terrace	510 to 650 feet above the river.

As summarized above, an analysis of the detailed observations reveals apparent evidence of at least five distinct terrace levels, and they have been so classified in the last column of the table. Attention is called to the fact that no terrace deposits were noted on the south side of Gauley or along its tributary streams that enter it from that side. Whether any terraces occur in the region immediately south of the river between Carnifex Ferry and Belva is not definitely known as the investigation for the present report did not cover that territory and previous publications on that region make no mention of their presence. On the tributary streams from the south between Carnifex Ferry and Camden-on-Gauley no terrace clays were noted but their presence should hardly be expected as there is no ponding of the streams and whatever

accumulations of this sort may have been formed have evidently been removed by post-Pleistocene erosion of the drainage channels. On the north side of Gauley, however, the principal tributary streams still preserve their channels on the high plateau-shelf and the deposits have been retained. Reference to the table will show that the deposits have no sustained relationship to Muddlety Creek, Peters Creek, and other tributaries along which they are found, but apparently belong to Gauley.

The **First Terrace** occurs at a level of 25 to 40 feet above Gauley, its position being plainly visible along the Flynn Lumber Company Railroad, 1.3 miles northwest of Marvel, there being an abundance of rounded boulders at a higher level than the normal flood-plain of recent times.

The **Second Terrace** is visible on Twentymile Creek, at the mouth of Bells Creek, 0.5 mile northwest of Belva, where clay and sand occur in considerable quantity on a low, rounded point, coming 90 feet above the level of Gauley.

The **Third Terrace** is more noticeable than any other, its elevation above Gauley varying from 210 to 315 feet, one observation of 355 feet being doubtfully assigned to this deposit. The height above Gauley apparently increases in going up the river, the erosion of later years having evidently been more active near its source. Most of the deposits of this terrace are found along Peters Creek and Muddlety Creek, and their tributary streams, and consist of yellowish-white clay, containing quartz pebbles at some points. A noticeable feature of their occurrence on Muddlety Creek is the presence of large quantities of dark spalls of flint, one inch or more in length. Inasmuch as no stratified flint or chert is found either on the waters of Muddlety Creek or on Gauley above the mouth of the former stream, but occurs in great quantity on Twentymile Creek and on the lower waters of Gauley, as well as on the Great Kanawha, it seems apparent that reverse currents of considerable magnitude must have carried these particles which were probably imbedded in cakes of ice formed in the region where the Kanawha Black Flint is prevalent. The presence of ancient mounds, built by Indians or possibly earlier inhabitants at certain points on the waters of Muddlety Creek, might account for a limited amount of flint

spalls, as these were much used in making arrowheads, such as were in common use by the Indians, but it seems more than a mere coincidence that they should be found in such large quantity in connection with terrace deposits, the conclusion that their accumulation was contemporaneous with the terrace clays being seemingly justified.

The **Fourth Terrace** is clearly visible at Zela Post-office where considerable quantities of sandy clay are visible on a low point over which the public highway passes, coming 90 feet above the level of Peters Creek and 440 feet above Gauley River, and also on the waters of Meadow Creek, 0.5 mile north of Keslers Cross Lanes, coming at an elevation of 455 feet above Gauley. At the latter point there is a large quantity of yellowish-white clay, similar in appearance to that found at the level of the Third Terrace on Muddlety Creek, but clearly at a much higher level and representing a different period of accumulation.

The **Fifth Terrace** is visible on Jerry Fork of Peters Creek, coming 255 feet above the level of Peters Creek and 515 above Gauley, and on Hutchinson Branch of the same creek, coming 125 feet above Peters Creek and 525 feet above Gauley. Another deposit, observed at a low divide between the waters of Muddlety Creek and Little Beaver, (a tributary of Beaver Creek), $2\frac{1}{2}$ miles northward from Calvin, apparently belongs at the same level, although it is 650 feet above the level of Gauley at the mouth of Muddlety but only 540 feet above Gauley at the mouth of Beaver Creek. The deposits ascribed to this latter terrace are similar in character to those of the Third and Fourth Terraces but clearly represent a different stage of accumulation.

The terrace deposits of Gauley are evidently of Pleistocene age, dating back to the time when the waters of Gauley, Great Kanawha and Ohio Rivers, which previous to that time flowed northward into the Saint Lawrence drainage basin, were impounded by the great ice dam near the present location of the town of Beaver, Pa., the various accumulations representing different stages of the dam. A comparison with the terraces of the Ohio River, as first described by Dr. White,² is most interesting. According to Dr. White, these terraces

²I. C. White, Second Geol. Sur. of Pa., Report Q, page 10; 1878.

are five in number, occurring at the following levels above the Ohio:

Ohio River Terraces.

Fifth Terrace.....	280 to 300 feet above the river.
Fourth Terrace.....	200 to 220 feet above the river.
Third Terrace.....	120 to 130 feet above the river.
Second Terrace.....	60 to 80 feet above the river.
First Terrace.....	30 to 40 feet above the river.

The five terraces of the Ohio extend southward entirely across the western end of the State of West Virginia. In a previous Report of the Survey³ Krebs has described the first four (in ascending order), occurring on the lower waters of the Great Kanawha, at about the same levels as noted by Dr. White, but makes no mention of the Fifth Terrace. In a later Report⁴ the same author describes two terraces along the Great Kanawha in Kanawha County, one of them coming 75 to 80 feet above the river and possibly representing the second Ohio River terrace, and the other 140 to 175 feet above the river, representing the third or fourth Ohio terrace. No published information is available on the terraces of the Great Kanawha and Gauley in Fayette County, the report of Mr. Hennen on that area being silent on the subject but in his unpublished notes a deposit of rounded boulders, of 1 to 10 inches diameter, is recorded on the Great Kanawha River near Kanawha Falls, coming 240 feet above the river, and apparently representing the fourth Ohio terrace.

The incomplete record of the terraces between Belva and Point Pleasant (mouth of Great Kanawha) is much to be regretted but a comparison seems to indicate that the **First Gauley Terrace** is the same as the **First Ohio Terrace**, the **Second Gauley Terrace** would represent the **Second or Third Ohio Terrace**, the **Third Gauley Terrace** seems to be the same as the **Fifth Ohio Terrace**, the **Fourth and Fifth Gauley Terraces** have no representation in the Ohio group, and the **Fourth Ohio Terrace** does not seem to be present on Gauley.

³C. E. Krebs, Jackson, Mason and Putnam Report, W. Va. Geol. Survey, pp. 33-34; 1911.

⁴C. E. Krebs, Kanawha Report, W. Va. Geol. Survey, pp. 52-54; 1914.

PART II.

Geology.

CHAPTER III.

STRUCTURE

METHOD OF REPRESENTING STRUCTURE.

The contour method of representing structure has been used in this Report. By this method the pitch or dip of the rocky strata over a given area is shown by determining the elevation of a coal bed or other easily recognized stratum at frequent points, and by connecting points of equal elevation with contour lines. When the area in question is covered with a succession of these lines, each representing a different stage of elevation, by a uniform interval, a complete map of the exact lay of the coal bed or other key rock is obtained. At any given point on the map stratified deposits, like those of Nicholas County, are approximately parallel, and as the interval between all surface strata may be closely measured at different points, it is possible to determine with practical accuracy the elevation of any coal bed or other desired stratum from the contours shown for the key rock. This method of representation is ideal for a region in which the dip of the rocks is gentle and free from faults or violent upheavals, and

as these conditions prevail in Nicholas County, the contour map answers the purpose in full without resort to graphic cross-sections.

In Nicholas there is a somewhat rapid and only slightly interrupted southeastward rise of the rocks which causes the Lower Kittanning (No. 5 Block), Stockton, Coalburg, and other large coal beds of the northwestern part to overshoot the ridges southeast of Summersville, and also causes the Eagle Coal to disappear above them a few miles farther in the same direction, and which brings above drainage the Sewell and other coals of the New River Group. Because of this complete change of outcropping deposits it was not found practicable to use the same key rock over the entire county. On Map II, which accompanies this Report and shows the structure of the rocks, the base of the **Eagle Coal** of the Kanawha Group has been used as the key rock for the northwestern half of the county. This coal crops on the waters of Beaver, Persinger, Muddlety, Peters and Twentymile Creeks, making it possible to determine elevations direct on this stratum at many points. In localities where it does not crop, or where no openings were available, its position was computed from other beds above or below it whose intervals from it at near-by points were carefully obtained. The contours on the Eagle Coal are shown on Map II by **green lines**, at successive 25-foot intervals, all contours being distinctly marked with proper figures so that there may be no confusion. It will be noted from the map that the Eagle green contours end with the 2300-foot level, which starts near Allingdale and passes roughly southwest about one mile north of Craigsville, through Nile, intersecting Gauley River one-half mile above Persinger Ford, passing one-half mile west of Canvas, crossing Hominy Creek one mile and a half above its mouth, going just northwest of Mt. Nebo and Mt. Lookout, and intersecting the Fayette Line just above Shawver Bridge across Meadow River.

In the southeastern portion of the county, embracing all its territory not outlined above, the base of the **Sewell Coal** of the New River Group was used for the contoured stratum, since it is by far the most persistent and most easily recog-

nized coal of that region. In distinction from the Eagle, the Sewell contours are shown by **red lines**, the same contour interval of 25 feet being employed. It will be noted on the map that the shift from green to red contours reveals the fact that the interval between the coals is not constant along the line of shifting, the interval remaining fairly uniform at 775 feet from Allingdale southwestward to the vicinity of Canvas, from which region to the Fayette Line there is a rapid increase to a maximum of 875 feet. This fact made it necessary to insert several short red contours in the region southwest of Canvas.

The detailed work necessary to prepare the structure map included several thousand observations on the two key rocks and other known stratigraphic horizons. Elevations were obtained mainly by the use of the aneroid, checked on the nearest government spirit-level determination as recorded on the topographic maps. In many cases it was possible to make hand-level measurements directly to the mines and prospects, thus reducing the possible error. Experience in other counties has proved that levels obtained by the aneroid, when checked on the topographic base maps, are seldom as much as 25 feet in error, being often within 5 to 10 feet of the truth, and it is believed that the map of Nicholas will generally come within these limits.

There is a considerable variation in interval between the different stratigraphic horizons, due mostly to a fairly constant thickening of the measures to the south and southwest. In order that this fact might not interfere with the accuracy of the structure map, or destroy its purpose, numerous detailed stratigraphic cross-sections and special measurements of intervals from place to place were made. The principal results of these many observations are condensed in the two following tables, the first of which shows intervals above or below the Eagle Coal, and the latter of which shows intervals above and below the Sewell Coal, all representing true vertical measurements. These tables have been used in determining contours on the key rocks in localities where direct observations could not be obtained. The place name indicated

at the heading of each column of intervals is not necessarily the exact point at which the intervals were obtained, as the measurements were made where the best exposures or borings could be obtained within a radius of a few miles, the column heading being the nearest well-known place name.

The use of these two tables in conjunction with the additional data presented in Chapter IV is recommended for those who prospect further for the various coals. Several columns in each table show vacant spaces either because the members named at the left belong above the tops of the ridges or because they lie below drainage and there are no present data to show the information called for. In order to find the approximate elevation of any coal its interval from the Eagle Coal, or Sewell, as the case may be, should first be obtained from one of the tables or from the local measured section for the nearest point. Having the structure contours as a guide the coal should then be easily found.

Intervals Above and Below Eagle Coal—Nicholas County.

Formation	Bentree	Birch River	Camden-on-Gauley	Dade	Deepwell	Gilboa	Harrist	Hominy Falls	Hookersville	Keslers Crosslanes	Mt. Lookout	Nallen	Richwood	Skyles	Summersville	Swiss	Tloga
Upper Freeport Coal.....	1090	920	840	825	.....	.....	1025	.....	850	.....	.....	.....	.....	835	.....	.....	835
Lower Freeport Coal.....	995	850	765	725	.....	.....	935	.....	730	.....	.....	.....	.....	775	.....	.....	770
Upper Kittanning Coal.....	915	770	715	650	.....	935	850	.....	635	.....	.....	.....	.....	705	.....	.....	700
Middle Kittanning Coal.....	835	710	640	575	.....	869	775	.....	570	.....	.....	.....	.....	615	.....	.....	615
Lower Kittanning (No. 5) Block Coal.....	755	680	590	525	.....	785	700	.....	515	.....	.....	.....	.....	.....	550	720	575
Clarion Coal.....	655	560	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	540	.....	540
Homewood Sandstone, Top..	740	650	555	460	.....	775	690	.....	490	.....	.....	.....	.....	570	530	710	535
Upper Mercer Coal.....	575	480	425	.....	.....	.....	.....	.....	430	.....	.....	.....	.....	485	430	.....	435
Kanawha Black Flint.....	675	545	440	380	.....	675	605	.....	370	.....	.....	.....	.....	415	395	625	405
Stockton Coal.....	645	540	435	375	.....	670	600	.....	365	.....	.....	.....	.....	410	390	620	400
Coalburg Coal.....	575	450	365	300	.....	600	535	.....	335	700	.....	.....	.....	370	370	545	365
Little Coalburg Coal.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Buffalo Creek Coal.....	465	370	295	265	.....	530	450	.....	315	600	.....	.....	.....	310	310	465	295
Winifrede Coal.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	550	.....	.....	.....	.....	.....	.....	.....
Chilton "A" Coal.....	400	250	260	240	.....	395	320	.....	275	510	.....	.....	.....	240	280	375	260
Chilton Coal.....	380	.....	.....	.....	.....	.....	.....	.....	.....	480	.....	.....	.....	.....	.....	.....	.....
Little Chilton Coal.....	.....	.....	.....	.....	.....	329	300	.....	240	435	.....	.....	.....	.....	240	300	245
Hernshaw Coal.....	340	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dingess Coal.....	290	.....	.....	.....	.....	.....	280	.....	190	.....	.....	.....	.....	.....	.....	.....	.....
Dingess Limestone.....	285	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Williamson Coal.....	200	300	200	200	.....	290	200	.....	185	345	.....	.....	.....	.....	.....	.....	.....
Cedar Grove Coal.....	200	200	200	160	.....	225	200	.....	160	245	.....	.....	.....	200	200	230	200
Lower Cedar Grove Coal.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Alma "A" Coal.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Alma Coal.....	150	175	160	.....	.....	.....	.....	.....	120	190	.....	.....	.....	175	.....	190	165
Little Alma Coal.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Campbell Creek (Peerless) Coal.....	130	135	125	90	125	115	125	.....	85	140	.....	.....	.....	135	125	160	125

Intervals Above and Below Sewell Coal—Nicholas County.

Formation	Bentze	Birch River	Camden-en-Gauley	Dade	Deepwell	Gilboa	Harriet	Heminy Falls	Hookersville	Keslers Crosslanes	Mt. Lookout	Nallen	Richwood	Skyles	Summersville	Swiss	Tioga
Lower Kittanning (No. 5 Block) Coal.....	1570	.....	1395	1125	.....	1535	1510	.....	1185	.....	.....	.....	.....	1065	1300	1470	1140
Home wood Sandstone, Top.....	1555	.....	1360	1120	.....	1525	1500	.....	1115	.....	.....	.....	.....	1000	1280	1466	1135
Upper Mercer Coal.....	1490	.....	1285	1100	.....	.....	.....	.....	1050	.....	.....	.....	.....	915	1180	.....	1035
Kanawha Black Flint.....	1460	.....	1245	1055	.....	1425	1415	.....	1005	.....	.....	.....	.....	845	1145	1375	1005
Stockton Coal.....	1460	.....	1240	1050	.....	1420	1410	.....	1000	.....	.....	.....	.....	840	1140	1370	1000
Coalburg Coal.....	1390	.....	1170	975	.....	1350	1365	.....	975	1500	.....	.....	.....	800	1120	1295	965
Little Coalburg Coal.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Buffalo Creek Coal.....	1280	.....	1100	940	.....	1280	1260	.....	950	1400	.....	.....	.....	740	1060	1215	895
Winifrede Coal.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chilton "A" Coal.....	1215	.....	1065	915	.....	1145	1130	.....	925	1350	.....	.....	.....	670	1030	1125	860
Little Chilton Coal.....	1195	.....	.....	.....	.....	.....	.....	.....	.....	1280	.....	.....	.....	.....	.....	.....	.....
Henshaw Coal.....	1155	.....	.....	.....	.....	1070	1110	.....	.....	1235	.....	.....	.....	.....	990	1050	845
Dingess Coal.....	1105	.....	.....	.....	.....	.....	.....	.....	850	.....	.....	.....	.....	.....	.....	.....	.....
Dingess Limestone.....	1100	.....	.....	.....	.....	.....	1090	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Williamson Coal.....	1015	.....	1080	875	.....	1040	.....	.....	845	1145	.....	.....	.....	.....	.....	.....	.....
Cedar Grove Coal.....	.....	.....	1005	835	.....	975	1010	.....	825	1045	.....	.....	.....	630	950	980	800
Lower Cedar Grove Coal.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Alma "A" Coal.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Alma Coal.....	965	.....	965	.....	.....	.....	.....	.....	.....	990	.....	.....	.....	605	.....	940	765
Little Alma Coal.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Campbell Creek (Peerless) Coal.....	945	.....	930	765	925	865	935	.....	760	940	.....	.....	.....	565	875	910	725
Campbell Creek (No. 2 Gas) Coal.....	905	.....	905	735	870	815	925	.....	725	885	(980)	(980)	.....	530	805	880	690

Intervals Above and Below Sewell Coal—Nicholas County (Continued).

Formation	Bentree	Birch River	Camden-on-Ganley	Dade	Depwell	Gilboa	Harriet	Hominy Falls	Hookersville	Keslers Crosslanes	Mt. Lookout	Nallen	Richwood	Skyles	Summersville	Swiss	Toga
Powellton "A" Coal.....	.....	.....	845	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	480	.....	.....	.....
Powellton Coal.....	.....	.....	835	.....	840	.....	.....	.....	.....	850	.....	.....	.....	470	.....	830	.....
Matewan Coal.....	.....	.....	805	.....	800	750	810	(850)	.....	800	(850)	(880)	(910)	430	750	750	600
Eagle Coal.....	815	.....	735	.....	750	680	770	.....	.....	750	.....	.....	.....	400	695	720	550
Little Eagle Coal.....	760	.....	725	.....	725	660	700	.....	.....	725	.....	.....	.....	340	675	670	510
Cedar Coal.....	740	.....	715	.....	700	640	700	(740)	.....	700	740	.....	.....	330	645	640	500
Eagle Limestone and Shale.	715	.....	715	.....	685	630	.....	.....	.....	680	.....	.....	.....	320	640	630	440
Little Cedar Coal.....	695	.....	715	.....	685	630	.....	.....	.....	680	.....	.....	.....	320	640	630	440
Lower War Eagle Coal.....	605	.....	690	.....	675	615	.....	.....	.....	630	.....	.....	.....	310	635	600	420
Glenatum Tunnel Coal.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gilbert Coal.....	545	.....	520	450	600	550	510	.....	.....	560	600	610	675	260	565	525	400
Douglas Coal.....	495	.....	420	.....	550	500	460	575	.....	500	540	550	615	230	500	450	340
Lower Douglas Coal.....	395	.....	400	.....	500	425	.....	435	.....	460	500	485	575	215	450	375	285
Upper Nuttal Sandstone, Top	365	.....	395	290	450	400	410	425	325	450	480	480	480	205	405	350	280
Laeger "B" Coal.....	.....	.....	.....	.....	330	.....	.....	335	.....	330	390	390	510	.....	.....	.....	.....
Lower Nuttal Sandstone, Top	225	.....	300	.....	325	300	275	325	.....	325	380	380	380	150	310	250	200
Hughes Ferry Coal.....	145	.....	180	75	210	200	200	250	200	175	250	275	385	130	200	150	125
Lower Ferry Coal.....	115	.....	155	.....	150	150	.....	170	200	140	200	230	300	150	130	90	80
Castle Coal.....	80	.....	105	.....	100	100	.....	130	.....	100	150	160	200	100	100	90	50
Sewell "B" Coal.....	55	.....	55	.....	40	50	.....	65	.....	70	80	70	155	25	50	50	30
Sewell "A" Coal.....	25	.....	20	.....	20	25	.....	25	.....	55	40	35	120	.....	25	25	10
SEWELL COAL.....	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Welch Coal.....	35	.....	65	.....	70	50	.....	50	10	.....	.....	.....	20	30	50	50	30
Little Raleigh Coal.....	145	.....	135	.....	150	150	.....	175	.....	.....	.....	150	160	100	150	160	85
Beckley Coal.....	.....	.....	.....	.....	200	.....	.....	275	.....	.....	.....	.....	265	160	.....	.....	.....
Fire Creek Coal.....	.....	.....	165	.....	250	.....	.....	350	.....	.....	.....	.....	325	220	.....	.....	100
Little Fire Creek Coal.....	.....	.....	.....	.....	280	.....	.....	.....	.....	.....	.....	.....	250	.....	.....	.....	.....
Princeton Conglomerate, Top	.....	.....	250	.....	.....	.....	.....	650	.....	.....	.....	.....	420	.....	.....	.....	.....
Greenbrier Limestone, Top...	835	.....	1190	725	1515	1000	670	1950	750	.....	.....	.....	.....	.....	1250	925	1100

It will be noted from Map II, as well as from the two tables above, that the structure map and tables mainly portray information that has bearing on the Pennsylvanian and upper portion of the Mississippian Rocks. Sufficient deep-well records are not available to make a sub-surface structure map on the Big Lime or the Berea Oil Sand, there being only enough data to make it certain that a structure map on the coals does not clearly show the structural features of these lower formations throughout the entire county. It is believed that in the northwestern portion of the county the structure map will be a fairly dependable guide to the lay of the oil sands but in the region south of Gauley where there is a great thickening of the Mauch Chunk and Greenbrier Series the contours on the Sewell Coal show a rapid rate of southeastward rise that does not prevail on the Berea Sand, and future drilling may reveal reverse dips in some localities.

DETAILED STRUCTURE.

General Features.

As shown by Map II the original structure of Nicholas has been only slightly disturbed by upward or lateral movements, the dip of the rocks being gentle and usually perceptible only by careful levels from point to point. Its present status is mainly that of a broad monocline showing a gradual southeastward rise of the rocks toward Greenbrier, Pocahontas, and Webster Counties, in the two former of which distortion of the strata has been much more severe, the general rise in Nicholas being mainly interrupted by two slight anticlines and their corresponding shallow synclines, in the western end of the county, and by another anticline which cuts across the extreme eastern end of the county. The lowest structural point shown on the map is at the extreme western end of the county where the Eagle Coal has an elevation of only 500 feet above sea-level. The highest structural elevation is on North Fork of Cherry River near the extreme eastern end of the county where the Webster Springs Anticline raises the Sewell Coal to an elevation of 3175 feet. Inasmuch as the

Eagle Coal horizon has an estimated interval of 910 feet above the Sewell in that locality, it would belong at 4085 feet, making a total southeastward rise of 3210 feet in the structural level.

The structure map harmonizes closely with those previously issued for adjoining counties. In Braxton and Clay contours have been shown on the Upper Kittanning Coal, and in northern Fayette they have been based on the No. 2 Gas Bench of the Campbell Creek Coal. When the proper intervals have been subtracted to reduce these two horizons to that of the Eagle Coal, which is far below the former bed, no important discrepancies are found. Webster County has been contoured on the Eagle and Sewell Coals, the contours agreeing with those recorded on the Nicholas Map. In southern Fayette the Sewell was used for the key rock and the contours for southern Nicholas on the same horizon agree with those of the former county.

Description of Anticlines and Synclines.

Mann Mountain Anticline.

The **Mann Mountain Anticline** of Hennen¹, named for its occurrence along the mountain of that name in Fayette County where it is well developed, originates at the Clay-Nicholas Line, on the headwaters of Leatherwood Creek of Elk. From that point it extends southwestward 7 miles, crossing Twenty-mile Creek at the mouth of Hardway Branch and Otter Creek $2\frac{1}{2}$ miles west of Lockwood. At Otter Creek it veers to a course slightly east of south and extends in this direction $3\frac{1}{2}$ miles to the Fayette County Line, crossing Gauley River 1.3 miles (air-line measure) southwest of the mouth of Peters Creek. In Fayette County it is described by Hennen as bearing S. 20° E. for about 12 miles to a point $\frac{3}{4}$ mile southeast of Divide; and thence almost due south for $8\frac{3}{4}$ miles to its apex on the summit of Mann Mountain, 2 miles north of Gentry, where it changes to a southwest course for 3 miles

¹Ray V. Hennen, Fayette Report, W. Va. Geol. Survey, pp. 91-92; 1919.

to a point 0.7 mile northwest of Greenwood; and thence almost due south, crossing New River into Raleigh County at Glade, beyond which it apparently dies out in the general southeast rise of the strata.

Throughout its course in Nicholas this fold is lacking in symmetry, the dip being more rapid on the west than on the east. There are no closed domes, the axis rising at an increasingly rapid rate from north to south, the Eagle Coal having an elevation of 850 feet at the Clay County Line, and 1725 feet at the Fayette Line, making a total rise of 875 feet, or at the rate of 83 feet per mile.

At the northern end the surface geology is that of the Allegheny Series and Kanawha Group of the Pottsville Series, and at the Fayette Line it is that of the Kanawha and New River Groups of the Pottsville. Natural gas has been found in commercial quantity at several points near its axis, as will be later described in Chapter IX.

Lockwood Syncline.

The **Lockwood Syncline**, not previously described or named, originates near the Clay-Nicholas Line, on the headwaters of Leatherwood Creek. From that point it extends roughly southward, and parallel to the Mann Mountain Anticline, for 11 miles, finally dying out against the general monocline in the vicinity of Lucas, at the Nicholas-Fayette Line, being a shallow but symmetrical basin throughout its course.

Enon Anticline.

The **Enon Anticline**, not previously described or named, originates near the Clay-Nicholas Line, near the head of Jim Young Fork of Lilly Fork of Buffalo Creek, and extends southeastward $5\frac{1}{2}$ miles to the head of Pine Run of Peters Creek, where it veers southwestward and so continues for 10 miles to the Nicholas-Fayette Line at the mouth of Meadow River, being a shallow, but mainly symmetrical, arch throughout its course.

Clifftop Syncline.

The **Clifftop Syncline** of Hennen², named from the town of Clifftop, Fayette County, originates at the head of Pine Run of Peters Creek, 3 miles northwest of Summersville, Nicholas County. From this point its course is generally southwestward for twelve miles, crossing Peters Creek 2.3 miles northwest of Summersville, passing one-half mile east of Keslers Cross Lanes, crossing the meanders of Gauley at three points and passing one-half mile east of Carnifex Ferry, and reaching a point on Meadow River one-third mile south of Dogwood Creek, where it enters Fayette County. In Fayette its course is slightly east of south for 7 miles, passing through Shawver Bridge and crossing Brackens Creek 2 miles above Russellville; thence southwestward through Cliff-top to its southwestern terminus, 1 mile southwest of Landis-burg.

Throughout its course in Nicholas this basin is fairly symmetrical, the rise being only gradual on either side of the axis. There is a shallow closed basin at the point where it crosses McClung Branch of Peters Creek, but elsewhere there is a continual rise southward along the axis, the elevation of the Eagle Coal at its northern end being 1675 feet, and 2250 feet at the Fayette Line, making a total rise of 575 feet, or at the average rate of 48 feet per mile for the 12 miles of its length in this county.

At the northern end the lower rocks of the Allegheny Series are present in the ridge tops, the Kanawha Group of the Pottsville composing the main surface beds. At the Fayette Line the Kanawha and New River Groups of the Pottsville are exposed, the former being only in the tops of the ridges. No prospecting for oil or gas has been done within its immediate sphere of influence in Nicholas County.

Webster Springs Anticline.

Southeast of the Clifftop Syncline no anticlines and syn-

²Ray V. Hennen, Fayette Report, W. Va. Geol. Survey, pp. 92-93; 1919.

clines occur and there are only slight terraces interrupting the general rise of the strata in Nicholas except at the extreme eastern end of the county where the **Webster Springs Anticline** of the writer³ cuts across it. This fold originates in northern Webster, two miles south of Hacker Valley, and thence, by a generally southward course, crosses Elk River at Webster Springs, Gauley River one mile east of Bolair, Williams River one mile and a half east of Dyer, and Cranberry River one-half mile west of Mill Branch, intersecting the Nicholas Line at a point 0.6 mile northwest of the Hanging Rock, which is the common corner of Nicholas with Webster and Greenbrier. In Nicholas County its total length is only two miles, its course being southwestward, crossing the Nicholas-Greenbrier Line just north of North Fork of Cherry River, and crossing that stream just east of the Nicholas Line, beyond which point its course has not been studied.

Through Nicholas this fold is lacking in symmetry, the dip on the west, which is very steep, being more rapid than on the east. There is a gradual southwestward rise along the axis, the elevation of the Sewell Coal at the Webster Line being 3125 feet and at the Greenbrier Line 3175 feet, making a total rise of 50 feet, or at the rate of 25 feet per mile.

Along that portion of the fold in Nicholas the surface rocks are those of the Kanawha and New River Groups of the Pottsville and the upper portion of the Mauch Chunk Series, the Kanawha being in the tops of the mountains, the New River along the slopes and the Mauch Chunk being exposed in the valley of North Fork of Cherry River.

UNCONFORMITIES AND ABSENCE OF FAULTS.

So far as known there are no unconformities in the Conemaugh and Allegheny of Nicholas, other than those of mere local occurrence, but at the base of the Pottsville Series where the Pennsylvanian Rocks rest upon the red shales of the Mauch Chunk there is a well-known unconformity of the kind that nearly always occurs when later deposits rest upon much

³D. B. Reger, Webster Report, W. Va. Geol. Survey, pp. 60-61; 1920.

older eroded formations. In all of the Pennsylvanian Rocks local thickening and thinning occurs and in Nicholas there is a considerable northward convergence in the Pottsville Series. Concerning the subsurface geology enough well records are available to know that the Catskill Series, containing the Venango Group of oil sands, has thinned out almost completely leaving practically no sands and only an uncertain amount of shales that may be attributed to this formation.

No faults were observed anywhere in the county and the dip of the strata is everywhere too gentle to favor their occurrence.

CHAPTER IV.

STRATIGRAPHY--MEASURED SECTIONS.

INTRODUCTION.

The surface rocks of Nicholas embrace the Quaternary, Pennsylvanian, and Mississippian. The Devonian Rocks do not outcrop but they have been pierced by several oil test wells in various parts of the county, the records of most of which are available.

The following classification of rocks available for study shows their succession in convenient form, arranged in descending order. The Permo-Carboniferous and the Monongahela Series of the Pennsylvanian are included at their proper positions but are not found in Nicholas County, having evidently been completely eroded during the long interval between the deposition of the lower groups of the Pennsylvanian and Quaternary. They are included in this classification because of their well-known occurrence in several adjoining counties on the north and northwest, and because of their probable existence in the Nicholas area many thousands of years ago:

AGE.	SERIES.	PERIOD.	
Quaternary	} Pleistocene } Recent		
Paleozoic	Permo-Carboniferous	Dunkard (Not found in Nicholas).	
		Monongahela... (Not found in Nicholas).	
		Conemaugh.... (Normally 500-600' thick, lower 300 feet found in Nicholas).	
	Pennsylvanian..	Allegheny..... (300-350').	
	Mississippian... {	Pottsville..... { Kanawha Group (800-1100').	
			New River Group (350-1050').
			Pocahontas Group (225').
		Mauch Chunk... { (Total thickness as shown by well records, 400 to 500'; only 450' of upper portion outcropping).	
		Greenbrier { (No outcrop; 100' to 400' shown by well records).	
		Limestone..... { (No outcrop; 300 to 600' shown by well records).	
		Pocono { (No outcrop; 300 to 600' shown by well records).	
Devonian..... {	Catskill..... (No outcrop; 400' to 700' shown by well records).		
	Chemung..... (No outcrop; 400' to 600' of upper portion shown by well records).		

The Quaternary Rocks are represented by clays, gravels, and sand beds, present in Nicholas along the river and creek bottoms, and by Pleistocene river-terrace deposits on the Gauley River and certain of its tributaries, as previously described, pages 85 to 90. These two types of recent material are shown on Map II under the general title of Alluvium. As agricultural soil they form a valuable economic resource of the county.

The Dunkard Series, generally recognized as a transitional stage and therefore classed as of Permo-Carboniferous Age, occurs in northern Braxton and northern Clay Counties which join Nicholas on the north and northwest, and was probably deposited over the latter county but has been entirely eroded, its disappearance being synchronous with the gradual uplift of the strata. The same statement is probably true of the Monongahela Series of the Pennsylvanian, which is known to have once covered an immensely greater area of the State than it now occupies. The Conemaugh Series, represented by about 600 feet of sediments in the counties adjoining on the north, has almost entirely disappeared from Nicholas, the lower portion of it, comprising about 250 feet of strata, being present in the extreme northwestern corner of the county.

The rocks of the lower portion of the Pennsylvanian, embraced by the Allegheny Series and the Kanawha and New River Groups of the Pottsville, comprise the great bulk of the surface deposits. The entire Allegheny is found in the northern end of the county but gradually disappears above the hills along with the southeastward rise of the strata, and is not found at all in the region south of Gauley River, its place in the hills being occupied by the Kanawha and New River Groups which come above drainage in succession.

Of the Mississippian Period, comprised by the Mauch Chunk, Greenbrier, and Pocono, only the first named crops in Nicholas, about 450 feet of the upper portion of it being visible along Cherry River southeast of Richwood, at the extreme eastern end of the county. Knowledge of the lower portion of the Mauch Chunk, the Greenbrier, and Pocono is scanty, there being a brief description of the first named in

Chapter VIII. The Greenbrier, as evidenced by well records, is mainly composed of gray limestone, with streaks of red shale and occasional sandy beds, its thickness ranging from 100 feet along the northwestern edge of the county to 400 feet at Hominy Falls where the farthest well toward the southeast was drilled. The Pocono, as revealed by the same source of information, is 300 to 600 feet thick, being composed of gray sandstones, with intervening beds of gray or red shale.

Knowledge of the Upper Devonian Rocks, including the Catskill and Chemung Series, is even more scanty than of the Mississippian. The Catskill, normally 400 to 800 feet thick in the northern end of the State, and composed of alternating beds of brown, red or gray sandstones, with intervening red shale deposits, has probably thinned down to 300 feet or less in the western end of the county, the sandstone members having almost totally disappeared. In the eastern end of the county the series is somewhat thicker but few sands are found in it. The Chemung Series, composed of thin beds of olive-green shales, with thin and lenticular beds of sandstone of olive-green or gray color, with occasional small quartz pebbles, has been penetrated by wells to a depth of only 400 to 500 feet.

Numerous geologic cross-sections, consisting of careful hand-level or aneroid measurements of surface strata, often combined with records of oil or coal test borings, and showing the rock succession from the Conemaugh to the Upper Devonian, will be given in the following pages, their arrangement being by magisterial districts.

MEASURED SECTIONS, JEFFERSON DISTRICT.

Jefferson District occupies the extreme western end of the county, next to Fayette, Kanawha, and Clay, and being entirely north of Gauley River. The surface rocks consist of the Allegheny Series and the Kanawha Group of the Pottsville, there being a few isolated summits along the Clay County Line in which the Conemaugh Series is present.

The following section, measured with aneroid and arranged in descending order, starts at the top of a high knob,

0.4 mile southeast of Bintree (formerly Carterboro), and descends westward to Open Fork of Bells Creek a short distance south of the village:

Bintree Section, Jefferson District.

	Thickness.	Total.
	Feet.	Feet.
Allegheny Series (188')		
Concealed and massive sandstone, Lower Freeport , from top of knob.....	30	30
Concealed in slope.....	65	95
Slate, black, Middle Kittanning Coal horizon (1410' B.).....	...	95
Concealed in steep slope.....	93	188
Bench, Lower Kittanning (No. 5 Block) Coal horizon (1317' B.).....	...	188
Pottsville Series—Kanawha Group (477')		
Concealed in slope.....	37	225
Concealed in steep bluff.....	38	263
Chert ledge, Kanawha Black Flint	2	265
Concealed	32	297
Coal, Stockton , thickness concealed (1208' B.) ...	...	297
Concealed	36	333
Sandstone, Upper Coalburg	10	343
Slate, black.....	20	363
Coal, slaty...0' 7" } Coal, splint..1 5 } Niggerhead..0 1 } (5' 0") Coalburg (1137' B.) Coal, splint..0 8 } Coal Bell Coal Co., Mine.. Niggerhead..0 1 } No. 321 on Map II. Coal, splint..1 5 } Shale, gray..0 6 } Coal .....0 3 }	5	368
Concealed and sandstone, Lower Coalburg ..	22	390
Concealed	160	550
Sandstone, massive, Hernshaw	22	572
Concealed	82	654
Sandstone, Upper Cedar Grove	10	664
Shale	1	665
Coal blossom , at creek level, Cedar Grove (840' B.).....	...	665
		297'

The following section, measured by Ray V. Hennen, and published in a previous Report of the Survey¹, starts at the summit of a high knob on the head of Payne Branch of Sycamore Creek in Clay County, one-half mile from the Nicholas Line, and extends northeastward along the road and trail to the bed of the latter stream via an opening in the Coalburg Coal on the east bank of Sycamore, just below the trail fork:

¹Ray V. Hennen, Braxton and Clay Report, W. Va. Geol. Survey, p. 148; 1917.

Payne Branch of Sycamore Creek Section, Pleasant District, Clay County.

	Thickness.	Total.	
	Feet.	Feet.	
Conemaugh Series (40')			
Sandstone, concealed, and shale, from summit of knob.....	40	40	40'
Allegheny Series (385')			
Sandstone, coarse, brown, conglomeratic, large quartz pebbles abundant, Upper Freeport	100	140	
Spring and concealed, Lower Freeport Coal horizon	10	150	
Fire clay shale, white.....	2	152	
Concealed	13	165	
Sandstone and concealed.....	35	200	
Sandstone, coarse, brown, medium-soft, slightly friable, large quartz pebbles abundant, Lower Freeport	50	250	210'
Concealed in bench, Upper Kittanning	15	265	
Sandstone, mostly concealed, Upper East Lynn	100	365	
Bench, Middle Kittanning Coal horizon	5	370	
Sandstone, East Lynn , and concealed.....	50	420	
Bench, No. 5 Block Coal horizon	5	425	175'
Pottsville Series—Kanawha Group (174')			
Concealed, steep slope.....	65	490	
Bench, Stockton "A" Coal horizon	5	495	
Sandstone	25	520	
Concealed, Kanawha Black Flint horizon , supplied from typical flint exposure 0.7 mile southeastward	10	530	105'
Concealed and sandstone	52	582	
Coal, splinty, bony.....0' 7" } Shale, dark-gray.....0 5 } Coal, splinty, slightly bony...2 3 } Slate, dark-gray.....0 3 } Coal, bony.....0 2 } Fire clay shale, sandy.....3 0 } Coalburg 13 Sandstone, massive.....1 3 } (1140' B.) 595 Shale, flaggy, sandy.....2 3 } Shale, dark, argillaceous....1 0 } Coal, gray splint, hard.....1 10 }			65'
Slate and concealed to bed of Sycamore Creek	4	599	4'

The following section, prepared by Ray V. Hennen and published in previous Reports of the Survey², is located in Nicholas County, the surface portion being measured on Rockcamp Fork of Twentymile Creek in the vicinity of Greendale, and being combined with the records of two core

²Ray V. Hennen, Braxton and Clay Rept., W. Va. Geol. Survey, p. 153; 1917; I. C. White, Vol. II(A), W. Va. Geol. Survey, p. 462; 1908.

drill tests (probably Nos. 2 and 3 on the Nicholas Map) in the immediate region, the details of which were furnished by J. R. Sharp:

Greendale Section, Jefferson District.

	Thickness. Feet.	Total. Feet.	
Allegheny Series (195.5')			
Sandstone, coarse, brown, capping hill.....25' } Upper East			
Sandstone, massive, making great cliffs.....65' } Lynn	90	90	
Coal, Middle Kittanning, visible 6".....	0.5	90.5	
Concealed and massive sandstone.....	105	195.5	
Coal blossom, "No. 5 Block".....		195.5	195.5'
Pottsville Series (684.4')			
Concealed	45	240.5	
Kanawha Black Flint.....	3	243.5	48'
Concealed	88	331.5	
Slate	1.7	333.2	
Slate, with streak of coal.....	0.3	333.5	
Coal, hard splint.....1' 9" } Coalburg, at old			
Bone coal.....0 1 } "Raven Mine"			
Coal, gas, 4" to.....0 6 } 3.5	3.5	337	93.5'
Coal, splint.....1 2 } 40			
Shale and concealed.....	40	377	
Coal, Winifrede.....	1.5	378.5	41.5'
Shale	8	386.5	
Coal, concealed, and massive sandstone.....	205.5	592	
Coal, Williamson?, visible 8".....	0.7	592.7	214.2'
Shale	40	632.7	
Sandstone, mostly, Upper Cedar Grove.....	15	647.7	
Coal, Cedar Grove, "Thacker".....	1.5	649.2	56.5'
Sandstone, mostly, partly concealed.....	104	753.2	
Coal, gas. 3' 2" } Campbell Creek			
Shale ....0 4 } "No. 2 Gas"	4.2	757.4	108.2'
Coal, gas. 0 8 } Peerless?			
Sandstone, mostly, partly concealed.....	120	877.4	
Coal, Eagle.....	2.5	879.9	122.5'

In the above section it is the opinion of the writer that the coal at 753.2 feet represents the Peerless rather than the No. 2 Gas Bench of the Campbell Creek.

The following section, measured with aneroid and arranged in descending order, starts at the top of a high knob, 0.6 mile northeast of the mouth of Hardway Branch of Twentymile Creek, and descends to the mouth of the branch, giving a very complete record of the strata in that vicinity. Some of the prospects recorded in the section had fallen shut, their thickness and character being reported by Mr. Irvin

Hughes, a resident, who accompanied the writer while the section was being made. The intervals recorded represent true vertical measurement as there was little dip, the axis of the Mann Mountain Anticline crossing Twentymile Creek at this point and bringing the Eagle Limestone above drainage:

Hardway Branch of Twentymile Section, Jefferson District.

	Thickness.	Total.	
	Feet.	Feet.	
Allegheny Series (210')			
Sandstone, massive, coarse, pebbly, Lower			
Freeport , capping knob.....	40	40	
Bench		40	
Sandstone, massive, coarse, brown, Upper			
East Lynn	85	125	
Concealed	10	135	
Bench, with coal blossom , Middle Kittanning			
(1805' B.).....		135	135'
Sandstone, massive, coarse, brown, East Lynn			
Coal, Lower Kittanning (No. 5 Block) (1730'			
B.) Prospect (No. 86 on Map II) fallen shut,			
reported (with partings)	8	210	75'
Pottsville Series—Kanawha Group (765')			
Concealed and massive sandstone, Homewood	62	272	
Concealed	25	297	
Chert ledge, Kanawha Black Flint (1640' B.)	3	300	90'
Concealed, with sandstone, Upper Coalburg...	28	328	
Coal, Coalburg (1600' B.; Prospect No. 328 on			
Map II), fallen shut, reported, (with partings)	12	340	40'
Concealed, with sandstone and dark slate....	101	441	
Coal .....0' 3" }			
Slate, gray 0 2 { (4' 2") Winifrede (1495' B.)			
Coal, semi- { Prospect No. 409 on Map II..	4	445	105'
splint...3 9 }			
Sandstone, partly concealed, in steep bank...	130	575	
Coal opening, abandoned, Hernshaw (1365' B.) ...		575	130'
Concealed in steep bank, with sandstone....	50	625	
Bench		625	
Concealed	50	675	
Coal opening, abandoned, Cedar Grove			
(1265' B.).....		675	100'
Concealed	84	759	
Sandstone, massive.....	10	769	
Shale, sandy.....	2	771	
Coal, soft.....0' 10 " } (3' 11") Campbell			
Slate .....0 0½ } Creek (Peerless			
Coal, soft.....0 9½ } Bench) (1165' B.)	4	775	100'
Coal, cannel splint.0 7 } Prospect No. 562			
Slate, bony.....0 5 } on Map II			
Coal .....1 3 }			

	Thickness.	Total.	
	Feet.	Feet.	
Concealed	7	782	
Coal, Campbell Creek (No. 2 Gas Bench) (1155' B.) reported.....	3	785	10'
Concealed	90	875	
Sandstone, massive, cliff.....	40	915	
Shale, gray.....	3	918	
Coal, Little Eagle (1020' B.).....	2	920	135'
Shale, gray.....	5	925	
Sandstone, shaly	15	940	
Shale, gray, sandy.....	21	961	
Coal, (0' 9"), Cedar?.....	1	962	42'
Shale, gray.....	2	964	
Limestone, dark, lenticular, one marine fossil found, Eagle (975' B.).....	1	965	3'
Shale, dark, sandy.....	5	970	
Concealed to Twentymile Creek (965' B.)....	5	975	

The following section, compiled by Ray V. Hennen, the surface portion of which was measured with aneroid by D. D. Teets, Jr., starts at the summit of a high knob $\frac{3}{4}$ mile due west of Wyndal, Fayette County, and extends down the long point, and continues with the log of the Newman No. 1 well (No. 3 on Map II), completed October 25, 1913, by the C. O. G. Company, the well record having been furnished the Survey by C. E. Krebs, of Charleston. This section has been previously published in the Fayette Report of the Survey, pages 133-135, the statement being made that, owing to the dip, the measurements of the surface portion are slightly greater than true vertical measurement would show, the dip over the line of traverse amounting to 20 to 25 feet:

Belva Section, Falls District, Fayette County.

	Thickness.	Total.	
	Feet.	Feet.	
Kanawha Group (1216')			
Sandstone, massive, coarse, gray, with brown specks, Homewood	75	75	75'
Concealed, probably holds Kanawha Black Flint	25	100	
Sandstone, Upper Coalburg , massive, making cliff, medium-grained, micaceous, gray and brown	60	160	85'
Concealed	50	210	
Sandstone, massive, cliff, medium-grained, Up- per Winifrede	25	235	
Concealed in bench, Winifrede Coal horizon ..	15	250	90'
Sandstone, Lower Winifrede	25	275	
Concealed	40	315	



PLATE V.—Looking up Gaultey River from point one-half mile below Swiss; Topography of Kanawha Group.
Photo by E. E. Harris.

	Thickness. Total.		
	Feet.	Feet.	
Sandstone	10	325	
Concealed	10	335	
Sandstone	25	360	
Concealed	50	410	
Sandstone	10	420	
Concealed	5	425	
Sandstone, Williamson	35	460	
Concealed in bench.....	30	490	
Sandstone, Upper Cedar Grove	55	545	
Concealed	25	570	
Sandstone, fine-grained, Peerless	65	635	
Concealed in bench.....	25	660	
Concealed	10	670	
Sandstone	10	680	
Concealed, probably holds No. 2 Gas Coal	20	700	450'
Shale and sandstone.....	20	720	
Concealed in bench.....	20	740	
Shale and concealed.....	45	785	
Sandstone, massive.....	30	815	
Concealed in bench, Eagle Coal horizon	20	835	135'
Concealed	48	883	
Coal and slate, Little Eagle	2	885	50'
Concealed	30	915	
Sandstone to top of Newman No. 1 Well (No. 3 on Map II) (745.6' L.).....	20	935	50'
(Continued with Log of Newman No. 1 Well—No. 3 on Map II):			
Gravel	34	969	
Slate, blue.....	25	994	
Slate, dark.....	30	1024	
Sand, light.....	5	1029	
Slate, dark.....	15	1044	
Slate and shale.....	25	1069	
Sand, light, hard.....	15	1084	
Slate, dark, hard.....	10	1094	
Sand, dark, hard.....	10	1104	
Slate, dark, soft.....	12	1116	
Lime, shale, light, hard.....	5	1121	
Slate, white, soft.....	25	1146	
Lime, white, hard.....	20	1166	
Slate, dark, soft.....	10	1176	
Lime, white, hard.....	15	1191	
Slate, white, hard.....	10	1201	
Lime, white, hard.....	15	1216	281'
New River and Pocahontas Groups (850')			
Sand, white, hard, Upper Nuttall	18	1234	
Slate, white, soft.....	10	1244	
Lime, white, hard.....	15	1259	
Slate, white, soft.....	5	1264	
Lime, white, hard.....	16	1280	
Conglomerate, hard, Lower Nuttall	77	1357	141'
Slate, dark.....	20	1377	
Sand, dark, hard	15	1392	
Slate, light, soft.....	5	1397	

	Thickness.	Total.	
	Feet.	Feet.	
Sand, light, hard.....	7	1404	
Slate and shales.....	63	1467	110'
Conglomerate	12'	1536	} Guyandot
Sand, white	57		
Lime, dark.....	12	1548	
Sand, dark.....	37	1585	
Lime, pink.....	15	1600	133'
Sand, white, Upper and Lower Raleigh and Quinimont, (water at 892' and 902').....	256	1856	
Slate, dark.....	108	1964	
Lime, dark.....	20	1984	
Sand, brown.....	72	2056	
Slate, dark.....	10	2066	466'
Mauch Chunk Series (359')			
Red rock.....	16	2082	
Lime, dark.....	10	2092	
Slate, dark.....	20	2112	
Lime, dark.....	20	2132	
Slate, dark.....	23	2155	
Red rock.....	66	2221	
Slate, dark.....	20	2241	
Dirty red rock.....	30	2271	205'
Sand, gray, Maxton, (Princeton Conglomerate?)	37	2308	
Slate, dark.....	35	2343	
Slate and sand shale.....	10	2353	
Slate, dark.....	18	2371	
Lime, gray.....	14	2385	
Slate, dark.....	40	2425	154'
Greenbrier Limestone (161')			
Big Lime.....	161	2586	161'
Pocono Sandstone Series (189')			
Sand, Keener, (gas).....	3	2589	
Sand.....	52'	2685	} Big Injun
Sand, (light gas in bottom)....	44		
Slate.....	1	2686	
Red sand.....	15	2701	
Lime, gritty.....	14	2715	
Slate.....	52	2767	
Lime, shale.....	4	2771	
Slate to bottom of hole.....	4	2775	189'
Casing record: 10", 35'; 8 $\frac{3}{4}$ ", 885'; 6 $\frac{5}{8}$ ", 1076'; and 5 $\frac{3}{16}$ ", 1552'.			

The following section, measured with aneroid and arranged in descending order, starts at the top of a high knob, 1.3 miles west of Swiss and one-half mile north of Gauley River, and descends southeastward to the river at the mouth of a branch, one-half mile west of the town. Inasmuch as the measures are rising rapidly in the direction in which the section was made the intervals recorded in the upper portion

are less than true vertical measurement would show, the lower portion, below the Eagle Coal, being more nearly on the strike and therefore more accurate. Several of the prospects noted had fallen shut and hence no information as to the thickness of the coals could be obtained:

Swiss Section, Jefferson District.

	Thickness. Feet.	Total. Feet.
Pottsville Series—Kanawha Group (965')		
Sandstone, massive, Homewood , makes great cliff capping knob.....	60	60
Concealed	15	75
Chert ledge, Kanawha Black Flint	5	80
Coal blossom, Stockton (Exposure No. 267 on Map II) (1570' B.).....	...	80
Concealed	40	120
Coal blossom, Coalburg "A" (Exposure No. 312 on Map II) (1530' B.).....	...	120
Concealed	35	155
Fire clay and coal blossom, Coalburg , (Exposure No. 322 on Map II) (1490' B.) reported	5	160
Concealed and sandy shale, with iron ore....	10	170
Sandstone, massive, cliff rock, Lower Coalburg	50	220
Concealed	15	235
Coal blossom, Winifrede (1415' B.).....	...	235
Concealed	25	260
Sandstone, massive, Upper Chilton	65	325
Bench with fire clay and coal blossom? , Chilton (1325' B.).....	...	325
Concealed	25	350
Sandstone, massive, Hernshaw	45	395
Concealed	15	410
Coal, Hernshaw , (1240' B.; Prospect No. 463 on Map II).....	...	410
Concealed and sandy shale.....	45	455
Sandstone and sandy shale.....	73	528
Sandstone, ferruginous.....	2	530
Shale, sandy and concealed.....	40	570
Bench, Cedar Grove Coal horizon.....	...	570
Concealed	65	635
Sandstone, massive, Eagle	60	695
Shale, gray.....	10	705
Coal, Eagle , (945' B.; Prospect No. 708 on Map II).....	...	705
Concealed	10	715
Sandstone, shaly, Decota	15	730
Shale, gray.....	5	735
Coal, Little Eagle (915' B.; Prospect No. 847 on Map II).....	...	735
Concealed and sandy shale.....	50	785
Sandstone, massive, makes cliff, Lower Gilbert?	70	855

	Thickness.	Total.	
	Feet.	Feet.	
Shale, black, Gilbert	50	905	
Coal blossom, reported, Gilbert? (745' B.)... ..	...	905	170'
Concealed	20	925	
Sandstone, massive, Dotson?	20	945	
Concealed	14	959	
Coal, Douglas? (690' B.) (reported 0' 10")....	1	960	55'
Concealed to Gauley River.....	5	965	

The following section, measured with aneroid and arranged in descending order, starts at the top of a high knob, 2.7 miles westward from Lockwood and 0.4 mile southward from the divide between Otter Creek and Little Elk Creek, and descends northward to the public road, being just west of the axis of the Mann Mountain Anticline. Measurement was made on the strike, giving true vertical intervals. It will be noted that the Kanawha Black Flint crops near the top of the mountain and the Eagle Limestone is present in the road, thus affording a good measurement between these two important horizons:

Lockwood Section, Jefferson District.

	Thickness.	Total.	
	Feet.	Feet.	
Pottsville Series—Kanawha Group (735')			
Sandstone, massive, capping knob, Homewood	10	10	
Concealed	35	45	
Chert boulders, Kanawha Black Flint (2040' B.) ...	...	45	45'
Concealed	55	100	
Fire clay.....	...	100	
Sandstone, massive, Upper Coalburg	46	146	
Shale, sandy, dark.....	3½	149½	
Coal, soft.....0' 10" } Slate, dark.....0 2 } Coal, soft.....0 3 } (5' 6") Coalburg Coal, splinty...3 3 } (1930' B.) Prospect Bone .....0 3 } No. 338 on Map II. Coal, soft.....0 4 } Shale, gray....0 2 } Coal, soft.....0 3 }	5½	155	110'
Sandstone, massive, Lower Coalburg	100	255	
Concealed	30	285	
Bench .....	...	285	
Concealed in steep slope.....	110	395	
Bench .....	...	395	
Concealed	90	485	
Bench .....	...	485	
Concealed	70	555	
Bench (No. 2 Gas).....	...	555	
Concealed	75	630	

	Thickness.	Total.	
	Feet.	Feet.	
Coal blossom at spring, Powellton (1455' B.) . . .		630	475'
Concealed	17	647	
Sandstone, Eagle, visible	1½	648½	
Coal, with streak of bone1' 0"	} (1' 6" Eagle (1435' B.) Prospect No. 718 on Map II	1½	650
Slate, dark0 2			
Coal, soft0 4			
Concealed	55	705	
Sandstone, visible	3½	708½	
Coal, Little Eagle (1375' B.) visible	1½	710	60'
Concealed	10	720	
Shale, dark, with marine fossils, Eagle, in public road (1350' B.)	15	735	25'

The following section, measured with aneroid and arranged in descending order, starts at the top of a high ridge, one-half mile northeast of Tipton, and descends southwestward to Laurel Creek of Peters Creek, 0.2 mile above the village. Being on the strike, the intervals show true vertical measurement:

Tipton Section, Jefferson District.

	Thickness.	Total.	
	Feet.	Feet.	
Pottsville Series—Kanawha Group (425')			
Shale, sandy and concealed	61	61	
Shale, dark, Newlon	10	71	
Coal, soft1' 4"	} (4' 4" Eagle (1655' B.) Mine No. 751 on Map II . . .	4	75
Coal, bony0 4			
Coal, soft2 3			
Slate0 1			
Coal0 4			
Shale, sandy, partly concealed	85	160	
Sandstone, massive, Decota	25	185	
Shale, dark, Eagle (1535' B.)	10	195	120'
Concealed	5	200	
Sandstone, massive, Lower Gilbert?	60	260	65'
Concealed and shale	35	295	
Sandstone, Dotson, and concealed in steep bank	60	355	
Concealed	25	380	
Sandstone, massive, Lower Dotson?	20	400	
Concealed	15	415	
Shale, dark, Douglas? (1310' B.)	5	420	160'
Concealed	5	425	
Pottsville Series—New River Group (20')			
Sandstone, massive, Upper Nuttall, to creek . .	20	445	

The following section, measured with aneroid and arranged in descending order, starts at the top of Panther

	Thickness.	Total.				
	Feet.	Feet.				
Slate	1	599				
Coal .....0' 6	} (5' 9") Campbell Creek Coal, (No. 2 Gas Bench) (1765' B.) (Frank John- son Mine, No. 621 on Map II).	6	605 45'			
Shale, gray..0 10						
Coal .....0 1						
Shale, dark..0 6						
Coal, soft....0 9½						
Slate, black.0 0½						
Coal, soft....1 4						
Slate .....1 0						
Coal .....0 8						
Concealed in bench.....	15	620				
Concealed in bluff, with sandstone, Eagle	49	669				
Shale, sandy, dark.....	10	679				
Coal, soft..1' 8"	} (6' 4") Eagle Coal (1685' B.) (Peter Keenan Mine, No. 745 on Map II).	6	685 80'			
Slate, dark.0 5						
Coal, soft..0 11						
Slate, dark.0 1						
Coal, soft..0 9						
Shale, gray.0 5						
Coal, soft..2 1						
Concealed and dark sandy shale, Eagle				95	780	95'
Sandstone, massive, Lower War Eagle				30	810	
Concealed	5	815				
Coal blossom, Lower War Eagle (1555' B.)... ..	815	835	35'			
Concealed	20	860				
Sandstone, massive, Upper Gilbert?	25	905				
Shale, sandy, partly concealed.....	45	905				
Shale, dark.....	25	930				
Sandstone, massive, Dotson	24	954				
Shale, sandy.....	1	955	140'			
Coal blossom, Douglas? (1415' B.).....	25	980	25'			
Shale and concealed, to top of Upper Nuttall Sandstone (1390' B.).....	25	980	25'			
(Section continued from top of Upper Nuttall Sandstone 1 mile east of Vinton , southwestward to Gauley River):						
New River Group (445')						
Sandstone, massive, Upper Nuttall	95	1075				
Concealed	10	1085				
Sandstone, massive, pebbly, great cliff, Lower Nuttall	150	1235	255'			
Concealed	90	1325				
Shale, black, and concealed.....	5	1330				
Coal blossom, Sewell "B" (1145' B.).....	1330	1345	95'			
Sandstone, massive.....	15	1345				
Coal blossom, Sewell "A" (1130' B.).....	1345	1397	15'			
Shale, dark, sandy and ferruginous, Hartridge Coal, soft, Sewell (3' 0") (K. & M. R. R. Pros- pect, No. 1151 on Map II) (1075' B.).....	52	1400	55'			
Shale and concealed.....	15	1415				
Sandstone, massive, Welch , to Gauley River ..	10	1425				

MEASURED SECTIONS, GRANT DISTRICT.

Grant District lies east of Jefferson and west of Summersville, being roughly rectangular in form, the longer axis extending from the Clay County Line to Gauley River. Its surface rocks range from the basal portion of the Conemaugh Series in the ridge tops at the north down through the Allegheny Series and Kanawha Group, and well into the New River Group of the Pottsville along Gauley River.

The following section, measured with aneroid and arranged in descending order, starts at the top of a high knob, 0.5 mile northwest of Harriet, and descends to the highway summit just westward and thence southward with the public highway to Twentymile Creek, one-half mile below the village. Owing to the southeastward rise of the strata the recorded intervals are less than true vertical measurement would show:

Harriet Section (North), Grant District.

	Thickness. Feet.	Total. Feet.
Allegheny Series (255')		
Sandstone, massive, pebbly, Upper Freeport, capping knob.....	35	35
Concealed	75	110
Bench		110
Sandstone, in bluff, Lower Freeport.....	45	155
Bench, Upper Kittanning Coal horizon.....		155
Sandstone, massive, Upper East Lynn.....	35	190
Concealed	15	205
Coal blossom, Middle Kittanning (1645' B.)...'		205
Concealed	50	255
Coal blossom, Lower Kittanning (No. 5 Block) (1595' B.).....		255
Pottsville Series—Kanawha Group (450')		
Concealed in bluff with sandstone, Homewood	95	350
Chert boulders, Kanawha Black Flint.....		350
Coal blossom, Stockton (1500' B.).....		350
Sandstone	15	365
Concealed	10	375
Sandstone, massive, Upper Coalburg.....	25	400
Concealed	25	425
Coal blossom, Coalburg (1425' B.).....		425
Concealed	5	430
Sandstone, massive, coarse, Lower Coalburg..	60	490
Concealed	35	525
Shale, dark, on bench.....	5	530
Concealed	85	615

	Thickness.	Total.	
	Feet.	Feet.	
Coal blossom, Cedar Grove? (1235' B.).....	615	190'	
Sandstone, massive, partly concealed, Middle Cedar Grove.....	35	650	
Concealed in bench.....	30	680	
Sandstone, massive, Monitor, to creek (1145' B.)	25	705	

The following section, measured with aneroid, and arranged in descending order, starts at the top of the ridge, 0.7 mile southeast of Harriet, and extends northwestward, mainly with the public road, to Twentymile Creek at the village, the Coalburg and Chilton Coals being inserted from near-by openings. Owing to the dip of the strata, the recorded intervals are greater than true vertical measurement would show:

Harriet Section (South), Grant District.

	Thickness.	Total.	
	Feet.	Feet.	
Allegheny Series (160')			
Sandstone, pebbly, Lower Freeport.....	20	20	
Concealed	45	65	
Sandstone, Upper East Lynn.....	10	75	
Concealed	85	160	
Pottsville Series—Kanawha Group (630')			
Sandstone, massive, Homewood.....	20	180	
Concealed	80	260	
Chert boulders, Kanawha Black Flint (1700' B.).....		260	260'
Concealed	43	303	
Coal opening, Coalburg, reported (with partings)	7	310	50'
Concealed	156	466	
Coal opening, Chilton (1490' B.) reported....	4	470	160'
Concealed	100	570	
Sandstone, massive.....	30	600	
Concealed	40	640	
Slate, black, and coal blossom, Cedar Grove? (1320' B.).....		640	170'
Sandstone, partly concealed.....	30	670	
Coal blossom, Alma? (1290' B.).....		670	30'
Concealed	25	695	
Sandstone, partly concealed.....	5	700	
Coal blossom, Campbell Creek (Peerless Bench) (1245' B.)		700	30'
Sandstone, massive.....	30	730	
Concealed, mostly black shale.....	40	770	
Sandstone, massive, to Twentymile Creek... ..	20	790	

The following section, measured with aneroid, and arranged in descending order, starts at the top of a high knob,

1 mile northwest of Gilboa, and extends southeastward with the public highway to the Douglas Coal at a point one-third mile northwest of the village, the remaining surface portion, starting at the same stratigraphic level, being measured from exposures just west of the mouth of Buck Garden Creek, where the section is continued down to the level of the **B. Frank Grose No. 1 (10) Coal Test Boring**, which is located near the junction of Buck Garden with Peters Creek, and thence with the record of the same to the bottom. The Survey is indebted to C. C. Sharp, of Nelsonville, Ohio, for the record of this hole. Owing to the southeastward rise of the strata that portion of the section above the Douglas Coal records shorter intervals than true vertical measurement would show:

Gilboa Section, Grant District.

Pottsville Series—Kanawha Group (1000')	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Sandstone, massive, Homewood , from top of knob.....	75	0	75	0	
Shale, sandy and concealed.....	15	0	90	0	
Slate, black, Stockton Coal horizon			90	0	90'
Sandstone, massive, Upper Coalburg	55	0	145	0	
Coal blossom , heavy, Coalburg (2060' B.).....	10	0	155	0	65'
Concealed and fire clay.....	25	0	180	0	
Sandstone, massive, coarse, Upper Winifrede	40	0	220	0	
Coal blossom , Winifrede (1995' B.)... ..			220	0	65'
Concealed, sandstone and shale....	54	0	274	0	
Slate, black, with marine fossils, Winifrede Limestone (1940' B.)... ..	1	0	275	0	
Coal blossom , Chilton "A" (?) (1940' B.).....			275	0	55'
Shale, sandy.....	5	0	280	0	
Sandstone, massive, Upper Chilton ..	67	0	347	0	
Coal , Chilton (1865' B.).....	3	0	350	0	75'
Concealed, and sandstone, massive, Hernshaw	60	0	410	0	
Shale, dark, sandy.....	7	0	417	0	
Coal .....0' 5" } Shale, } (2' 8") Hernshaw gray ...2 0 } (Exposure No. 466 on 3 } Map II; 1795' B.)			2	8	419 8
Coal .....0 3 }					70'
Shale, sandy and concealed.....	30	4	450	0	
Coal blossom , Williamson (1765' B.)			450	0	30'
Shale, sandy, gray.....	45	0	495	0	
Shale, dark.....	8	0	503	0	

	Thickness. Ft. In.	Total. Ft. In.		
Coal, with cannel bone, Cedar Grove (1710' B.).....	2 0	505 0	55'	
Sandstone, shaly, Middle Cedar Grove	15 0	520 0		
Concealed	30 0	550 0		
Sandstone, Peerless.....	20 0	570 0		
Concealed and fire clay.....	5 0	575 0		
Sandstone, massive, Monitor.....	15 0	590 0		
Concealed	5 0	595 0		
Coal blossom, Campbell Creek (Peerless Bench) (1620' B.).....	... ..	595 0	90'	
Sandstone, massive.....	25 0	620 0		
Concealed	15 0	635 0		
Coal, Campbell Creek (No. 2 Gas Bench) (Prospect No. 628 on Map II; 1580' B.) fallen shut.....	... ..	635 0	40'	
Concealed and dark shale.....	51 0	686 0		
Coal, soft...1' 2" } Slate, bony...0 3 } (3' 11") Eagle Coal, soft...2 2 } (Mine No. 767 on Coal, splint, } Map II) (1535' B.) reported...0 4 }	3 11	689 11	55'	
Concealed and shale.....	64 1	754 0		
Coal blossom, Little Eagle (1460' B.)	1 0	755 0	65'	
Shale, dark, with Naiadites fossils, Eagle	35 0	790 0		
Concealed	10 0	800 0		
Sandstone, massive, Lower Gilbert	24 0	824 0		
Coal, slaty, Gilbert (1390' B.).....	1 0	825 0	70'	
Concealed	15 0	840 0		
Sandstone, massive, Dotson.....	40 0	880 0		
Shale, dark, with fire clay and limestone concretions.....	25 0	905 0		
Sandstone	12 0	917 0		
Concealed	3 0	920 0		
Coal blossom, Douglas (1295' B.)... ..	... ..	920 0	95'	
Continued from exposures at mouth of Buck Garden Creek:				
Sandstone, massive, Lower Dotson..	35 0	955 0		
Continued by B. Frank Grose No. 1 (10) Coal Test Record (1325' B.):				
Surface	3 0	958 0		
Sandstone, Lower Dotson.....	30 0	988 0		
Shale, sandy.....	12 0	1000 0		
Pottsville Series—New River Group (298' 9")				
Sandstone, crystallized, Upper Nuttall	55 0	1055 0		
Shale, sandy.....	30 0	1085 0		
Sandstone	5 0	1090 0		
Coal, laeger "B".....	0 8	1090 8	170' 8"	
Sandstone	12 0	1102 8		
Slate, sandy.....	46 0	1148 8		
Sandstone, crystallized, Lower Nuttall	100 0	1248 8		
Slate, horizon of Hughes Ferry Coal	9 0	1257 8	167'	

	Thickness.		Total.			
	Ft.	In.	Ft.	In.		
Sandstone	30	8	1288	4		
Coal, Lower laeger	0	10	1289	2	31'	6"
Fire clay.....	2	6	1291	8		
Sandstone	6	0	1297	8		
Coal	0	7	1298	3		
Sandstone, very hard, to bottom...	0	6	1298	9		

The following section, measured with aneroid and arranged in descending order, starts at the top of a high ridge, 1 mile west of Burl, and extends eastward to Whitewater Branch of Peters Creek, one-half mile west of the village. Recorded intervals are approximately correct, there being only a small amount of rise in the strata:

Burl Section, Grant District.

	Thickness.		Total.		
	Feet.	Feet.	Feet.	Feet.	
Pottsville Series—Kanawha Group (415')					
Concealed and sandy shale.....	81	81			
Bench, with coal, Eagle (1765' B.) reported...	4	85			85'
Concealed	25	110			
Sandstone, massive, Decota , and concealed...	40	150			
Shale, sandy.....	35	185			
Slate, dark, Eagle	35	220			
Sandstone, massive, Lower Gilbert	35	255			
Concealed in bench.....	8½	263½			
Coal, Gilbert (1585' B.) reported.....	1½	265			180'
Concealed in slope, mostly sandy shale.....	150	415			
Pottsville Series—New River Group (55')					
Sandstone, massive, Upper Nuttall	55	470			
Coal streak, laeger "B" , reported in creek (1380' B.).....		470			205'

The following section, measured with aneroid and arranged in descending order, starts at the top of the ridge, 0.6 mile northeast of Carnifex Ferry, and extends southwestward with the public highway to Gauley River at the mouth of Meadow River where the ferry is located, the Sewell Coal being added from an exposure on the south side of Gauley, one-half mile below the ferry, as recorded by Ray V. Hennen in the Fayette Report of the Survey, page 143:

Carnifex Ferry Section, Grant District.

	Thickness.	Total.	
	Feet.	Feet.	
Pottsville Series—Kanawha Group (20')			
Concealed	20	20	20'
Pottsville Series—New River Group (510')			
Sandstone ....45' } Upper Nuttall			
Concealed ....10 } (top, 1685' B.)	100	120	
Sandstone ....45 }			
Concealed	20	140	
Sandstone, great cliff, pebbly, Lower Nuttall (1455' B.)	110	250	
Shale	2	252	
Coal, Hughes Ferry , reported on south side of river, 0' 10" to.....	2	254	234'
Concealed	6	260	
Sandstone, Middle laeger	25	285	
Concealed	10	295	
Sandstone, Harvey	10	305	
Concealed	35	340	
Slate, dark, and fire clay, Castle Coal horizon (1365' B.).....		340	86'
Concealed	103½	443½	
Coal, Sewell "B" , reported on south side of river	1½	445	105'
Sandstone, great cliff, Lower Guyandot , to Gauley River at ferry, (1180' B.).....	80	525	
Interval (estimated).....	3	528	
Coal, Sewell , reported on south side of river	2	530	85'

MEASURED SECTIONS, SUMMERSVILLE DISTRICT.

Summersville District, roughly rectangular in form, with the long axis extending in a northwest-southeast direction, lies east of Grant and west of Hamilton, bordering on Clay County at the northwest and Gauley River at the southeast. Its surface rocks include, besides some slight remaining deposits of the Conemaugh Series along the Clay County Line, the Allegheny Series, and the Kanawha and New River Groups of the Pottsville, the latter being exposed along Gauley River and some of its tributaries.

The following section, measured with aneroid and arranged in descending order, starts at the top of the ridge, 2.2 miles southeast of Sparks, and extends southward, down Long Point, to Gauley River, being made against the rise of the rocks and therefore recording shorter intervals than true vertical measurement would show:

Long Point of Gauley Section, Summersville District.

	Thickness.	Total.	
	Feet.	Feet.	
Pottsville Series—Kanawha Group (60')			
Sandstone, sandy shale, and concealed from top of point.....	60	60	60'
Pottsville Series—New River Group (380')			
Sandstone, massive, Upper Nuttall (top, 1840' B.).....	60	120	
Concealed	44	164	
Sandstone, massive, pebbly, great cliff, Lower Nuttall	105	269	
Coal, (0' 10") Hughes Ferry (1630' B.).....	1	270	210'
Shale and concealed.....	1	271	
Sandstone, Middle laeger	20	291	
Concealed	25	316	
Sandstone, massive, Harvey	20	336	
Shale, sandy.....	3	339	
Coal, soft, Castle (1560' B.).....	1	340	70'
Shale, dark.....	30	370	
Coal, slaty, Sewell "B", streak (1530' B.).....	...	370	30'
Shale, dark.....	10	380	
Coal, Sewell "A", streak (1520' B.).....	...	380	10'
Shale, dark.....	5	385	
Concealed	50	435	
Shale, dark, Hartridge	1	436	
Coal, in river, Sewell (1460' B.) reported 3' to	4	440	60'

The following section, measured with hand-level and arranged in descending order, starts at the top of Lonetree Mountain and extends northeastward to Peters Creek, one-half mile northeast of Summersville, intervals being slightly less than true vertical measurement would show, as there is about 25 feet of rise in the rocks in the direction in which the section was made. In this mountain the strata extend high enough in the measures to include the Kanawha Black Flint, but its cherty phase apparently does not occur east of Gilboa, and the fossils that often accompany its shaly development were not noted as there was a concealed interval of 47 feet above the blossom of the Stockton Coal where it should be found:

Summersville Section, Summersville District.

	Thickness.	Total.	
	Feet.	Feet.	
Allegheny Series (55')			
Concealed from top of Lonetree Mountain....	35	35	
Coal blossom, Lower Kittanning (No. 5 Block) (2520' B.).....	...	35	35'

	Thickness.	Total.	
	Feet.	Feet.	
Concealed	20	55	
Pottsville Series—Kanawha Group (670')			
Sandstone, massive, Homewood	100	155	
Concealed in steep slope.....	47	202	
Bench, Stockton Coal horizon (2353' B.).....	...	202	167'
Concealed	20	222	
Coal blossom, Coalburg (2333' B.).....	...	222	20'
Concealed	30	252	
Bench .....	...	252	
Concealed	30	282	
Bench .....	...	282	
Concealed	38	320	
Bench .....	...	320	
Concealed in steep slope.....	93	413	
Sandstone, Monitor, quarry rock	20	433	
Concealed	30	463	
Fire clay and black slate, Campbell Creek (Peerless Bench) Coal horizon (2092' B.).....	...	463	241'
Sandstone, massive.....	17	480	
Concealed	55	535	
Slate, black, Campbell Creek (No. 2 Gas Bench) Coal horizon (2020' B.).....	...	535	72'
Concealed	45	580	
Sandstone, massive, Eagle	6	586	
Slate, black (0' 2").....	...	586	
Coal, cannell. 0' 5" } (3' 9") Eagle			
Coal, soft... 0 9 } (1965' B.) Mine No. 798	4	590	55'
Slate, bony... 0 4 } on Map II			
Coal, soft... 2 3 }			
Slate and concealed.....	27	617	
Sandstone, Decota	20	637	
Concealed	6	643	
Fire clay at opening, Little Eagle Coal horizon (1912' B.).....	...	643	53'
Concealed, mostly sandy shale.....	33	676	
Shale, dark, with marine fossils, Eagle	20	696	
Slate, black, coaly, Lower War Eagle Coal (1857' B.).....	2	698	55'
Sandstone, massive, Lower Gilbert, to creek	27	725	

The following section, measured with aneroid and arranged in descending order, starts at the top of a point, 1.6 miles northeast of Summersville, and extends southeastward mostly with the public highway to the point where the Summersville and Slaven Cabin Road crosses Muddlety Creek, 1.7 miles northeast of the town. The recorded intervals are less than true vertical measurement would show, there being about 50 feet of rise in the rocks over the line of traverse:

Muddlety Creek Section, Summersville District.

	Thickness. Total.		
	Feet.	Feet.	
Pottsville Series—Kanawha Group (138')			
Sandstone, massive, Lower Gilbert	55	55	
Concealed	15	70	
Spring, with coal blossom, Gilbert (1870' B.) ...		70	70'
Concealed	24	94	
Sandstone, massive, Dotson	40	134	
Shale, ferruginous, Douglas	1	135	
Coal, (0' 4"), Lower Douglas (1805' B.)		135	65'
Shale and concealed.....	3	138	
Pottsville Series—New River Group (72')			
Sandstone, massive, Upper Nuttall	62	200	
Concealed to Muddlety Creek.....	10	210	

The following section, measured with aneroid and arranged in descending order, starts at the top of a high ridge, 0.7 mile southwest of the mouth of Fockler Branch of Muddlety Creek and 2 miles southward from Muddlety Post-office, and extends eastward to the public highway, 0.4 mile south of the branch. The recorded intervals are less than true vertical measurement would show, as there is 50 feet or more of rise in the rocks over the course traversed. The Campbell Creek (No. 2 Gas Bench) Coal crops just above drainage and just beneath the public highway, the remaining portion of the section, including the Eagle Coal, being reported by Omar G. Robinson, civil engineer, in whose well the coal was found:

Fockler Branch of Muddlety Section, Summersville District.

	Thickness. Total.		
	Feet.	Feet.	
Allegheny Series (245')			
Sandstone, capping knob, Upper Freeport ...	30	30	
Concealed in slope.....	35	65	
Sandstone, massive, coarse, light-brown, Lower Freeport	60	125	
Bench		125	
Sandstone in steep bank, Upper East Lynn ..	55	180	
Concealed in slope.....	50	230	
Bench, Lower Kittanning (No. 5 Block) Coal horizon (2300' B.)		230	230'
Concealed	15	245	
Pottsville Series—Kanawha Group (475')			
Sandstone, massive, Homewood , and concealed	135	380	
Bench, with coal blossom, Stockton (2150' B.) ...		380	150'

	Thickness. Total.		
	Feet.	Feet.	
Concealed	80	460	
Bench, with coal blossom, Coalburg (2070' B.) ...		460	80'
Concealed	67	527	
Coal blossom, Chilton? (2000' B.) reported...	3	530	70'
Shale, sandy and concealed.....	50	580	
Sandstone, shaly, and concealed.....	20	600	
Shale, sandy, with limestone turtlebacks, Campbell Creek Limestone.....	25	625	
Slate, black.....		625	
Shale and concealed.....	17	642	
Coal, Campbell Creek (Peerless Bench) (1885' B.) reported.....	3	645	115'
Concealed	26½	671½	
Coal, with partings, Campbell Creek (No. 2 Gas Bench) (Mine No. 638 on Map II; 1855' B.).....	3½	675	30'
Unrecorded	45	720	
Coal, Eagle, reported in Omar G. Robinson Well		720	45'

In the following section, measured with aneroid and arranged in descending order, the surface portion starts at the top of the ridge, 0.7 mile southeast of Dade, and extends southeastward and thence southwestward to the level of the Elk River Coal & Lumber Company No. 1577 (19) Oil Test Well on Beech Fork of Lilly Fork of Buffalo Creek, with the record of which it is continued to the bottom of the hole. This test was drilled only into the upper portion of the Mauch Chunk Series, not having reached the more probable productive sands of the region:

Dade Section, Summersville District.

	Thickness. Total.		
	Feet.	Feet.	
Allegheny Series (110')			
Sandstone, pebbly, capping knob, Upper East Lynn	40	40	
Concealed	25	65	
Sandstone, massive, coarse, soft, East Lynn..	35	100	
Slate, black, Lower Kittanning Coal horizon. ...		100	100'
Concealed	10	110	
Pottsville Series—Kanawha and New River Groups (1700')			
Sandstone, massive, brown, coarse, Homewood	65	175	
Coal blossom, Upper Mercer (1945' B.).....		175	75'
Fire clay shale and concealed.....	5	180	
Sandstone, brown, coarse.....	15	195	
Coal blossom (1925' B.).....		195	20'
Concealed, sandstone, and concealed.....	44	239	

	Thickness. Feet.	Total. Feet.	
Slate, black, with marine fossils, Kanawha			
Black Flint.....	3	242	
Coal blossom, Stockton, (1870' B.) thickness supplied	3	245	50'
Concealed	290	535	
Continued by Elk River Coal & Lumber Com- pany No. 1577 (19) Well Record (1580' B.):			
Unrecorded	87	622	
Coal, Eagle?.....	3	625	380'
Unrecorded	115	740	
Sand	40	780	
Unrecorded	65	845	
Coal, Gilbert?.....	3	848	223'
Unrecorded	162	1010	
Sand, Upper Nuttall.....	105	1115	
Slate	100	1215	
Sand	110	1325	
Slate, black.....	60	1385	
Sand	50	1435	
Slate	60	1495	
Sand, Rosedale Gas?.....	105	1600	
Slate	35	1635	
Sand, Rosedale Salt?.....	175	1810	
Mauch Chunk Series (590')			
Slate	115	1925	
Lime	120	2045	
Red rock.....	150	2195	
Slate	80	2275	
Lime	25	2300	
Sand	35	2335	
Slate	40	2375	
Concealed to bottom.....	25	2400	

13" casing, 29'; 10" casing, 554'; 8¼" casing, 1495'; 6⅝" casing, 1854'.

The following section, prepared by Ray V. Hennen and published in a previous Report of the Survey³, is located in Clay County, about one mile from the Nicholas line, and furnishes valuable detailed information on the stratigraphy of this region, Mr. Hennen's description, which follows, being self-explanatory:

"The upper 272 feet of the section was measured from the summit of a knob, 0.8 mile southwest of the mouth of Beech Fork, northeastward to a closed prospect opening in the No. 5 Block Coal bed; and that extending on down to the top of the boring was determined from another prospect opening in the same coal northeastward to the bed of Lilly Fork, 0.2 mile southeast of the Clay-Nicholas County Line, both

³Ray V. Hennen, Braxton and Clay Report, W. Va. Geol. Survey, pp. 139-142; 1917.

determinations being practically on the strike of the rocks. The boring in question is located on the north bank of Lilly Fork, 5 feet above the bed of the latter and about 150 yards west of the mouth of Beech Fork, the coal correlated with the Hershaw cropping in the bed of the former stream opposite the well:"

Beech Fork of Lilly Section, Henry District, Clay County.

	Thickness.		Total.	
	Ft.	In.	Ft.	In.
Allegheny Series (285')				
Concealed, steep slope, from top of knob	55	0	55	0
Bench, Lower Freeport Coal horizon	10	0	65	0
Concealed, steep slope.....	50	0	115	0
Bench, Upper Kittanning Coal horizon	10	0	125	0
Sandstone, grayish-white, coarse-grained, very conglomeratic, pebbly, resting unconformably on ledge below, Upper East Lynn...	55	0	180	0
Sandstone, East Lynn, current-bedded, medium-grained, hard, and concealed, steep slope, and slate..	92	0	272	0
Coal .....2' 0" } (prospect closed,				
Slate, black..2 0 } section as given	13	0	285	0
Coal .....9 0 } by native, A. A. Hamrick).				160'
Pottsville Series—Kanawha Group (838' 8¾")				
Concealed in steep slope.....	120	0	405	0
Kanawha Black Flint, typical of Kanawha Valley.....	5	0	410	0
Bench, Stockton Coal horizon.....	10	0	420	0
Concealed, steep slope.....	55	0	475	0
Bench, Coalburg Coal horizon.....	10	0	485	0
Concealed, steep slope.....	85	0	570	0
Coal, splinty, visible..0' 6" } Chilton				
Shale, gray.....3 0 } "A"	5	0	575	0
Sandstone .....1 0 } Coal, gas, 5" to.....0 6 }				
Shale, bluish-gray, argillaceous, marine fossils abundant, several species, Producti abundant, Winifrede Limestone horizon.....	10	0	585	0
Coal, medium-soft..0' 0½" } Chilton.	3	10	588	10
Slate .....0 0½" } Bone, 1" to.....0 2 }				103' 10"
Coal, medium-soft..0 5 } Coal, medium-soft..0 5 }				
Bone, 1" to.....0 2 } Bone, hard.....0 2 }				
Coal, hard, with sulphur balls.....2 7 }				
Slate	1	2	590	0
Sandstone, massive, Lower Chilton	30	0	620	0

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Continued with Elk River Coal and Lumber Co. Boring (No. 9 on Map II), (1085' B.):					
Surface wash and gravel (14" of Hernshaw Coal , cropping 5' below top of hole).....	13	6	633	6	
Black slate...3' 6" }					
Coal .....0 4					
Slate .....0 1½	} Williamson...	5 7½	639	1½	50' 3½"
Coal .....0 7					
Bone .....0 5					
Coal .....0 8					
Fire clay.....	1	3	640	4½	
Gray sandy shale. 7' 10" }					
Fine-grained gray sandstone or shale .....19 4	} Upper Cedar Grove Sandstone	46 9½	687	2	
Light sandy shale.19 7½					
Slate	4	4	691	6	
Coal ....0' 6" }					
Bone ...0 2	} Cedar Grove.....	1 10	693	4	54' 2½"
Coal ....0 10					
Bone ....0 2					
Coal ....0 2					
Fire clay (bastard).....	0	6	693	10	
Sandy shale.....4' 6" }					
Light sandy shale.....2 3	}	8 7	702	5	
Sandy shale.....1 10					
Dark slate or shale.....	4	7	707	0	
Light sandy shale.....	1	11½	708	11½	
Light fine-grained gray sandstone, shaly	19	0	727	11½	
Sandy shale or slate.....	4	9½	732	9	
Light fine-grained gray sandstone. 7' 1½" }					
Dark fine-grained gray sandstone.. 1 5½	} Peerless	23 3	756	0	
Light fine-grained gray sandstone..14 8					
Black slate soapstone... 2' 8" }	}	17 3	773	3	
Black slate.....14 7					
Coal and slate .. 0' 5" }					
Coal .....0 7	} Campbell Creek.. (Peerless Bench)	2 2	775	5	82' 1"
Bony coal.0 1½					
Coal .....1 0½					
Fire clay (bastard).....	0	6½	775	11½	
Light fine-grained gray sandstone.31' 5" }					
Light fine-grained gray sandstone, streaked .....14 6	} Brownstown Sandstone.	65 9	841	8½	
Light fine-grained gray sandstone. 7 1					
Shale sandstone, gray streaked..12 9					

	Thickness.		Total			
	Ft.	In.	Ft.	In.		
Coal0' 11½" } Powellton.	1	3	842	11½	67'	6½"
Slate and bone.0 3½ } }						
Fire clay.....	1	1	844	0½		
Fire clay and slate, mixed.....	3	10	847	10½		
Light shale..... 6' 1" }	21	11	869	9½		
Light-gray sandy shale...15 10 }						
Light-gray sandstone, Eagle	49	11½	919	9		
Black sandy shale.....	13	9	933	6		
Black slate.....	14	6	948	0		
Coal, bony.0' 7 " } Eagle	2	9½	950	9½	107'	10"
Coal .....2 2½ } }						
Fire clay.....	3	0	953	9½		
Dark sandy shale.....	21	9	975	6½		
Light sandy shale.....	8	4	983	10½		
Coal, bony...0' 1 " }						
Coal .....0 6 } Little Eagle ...	2	3½	986	2	35'	4½"
Slate .....0 1 } }						
Coal .....1 7½ } }						
Light sandy shale.....	26	7	1012	9		
Black slate (sandy), Eagle Black						
Slate and Limestone	35	8	1048	5	62'	3"
Fire clay, Little Cedar Coal horizon	1	6	1049	11		
Light-gray shale.....	25	8	1075	7		
Gray sandstone.. 7' 7" } Upper						
Gray sandstone, } Gilbert? ...	34	5	1110	0		
streaked .....26 10 } }						
Gray sandstone..4' 3 " }						
Shale .....0 7 } }						
Sandstone .....0 9½ } }						
Gray sandy shale 1 4 } }						
Gray sandstone..1 5 } Lower						
Sandy shale....0 2¼ } Gilbert? ...	13	8¾	1123	8¾	75'	3¾"
Gray sandstone..2 1½ } }						
Sandy shale....0 8 } }						
Rough sandstone } }						
streaked with } }						
coal, Gilbert ..2 4½ } }						
Pottsville Series—New River Group (254' 4¼")						
Gray sandstone.....	6	9	1130	5¾		
Gray sandy shale (very slaty).....	48	10	1179	3¾		
Gray sandstone with coal streaks...	8	10	1188	1¾		
Slate 3 10	3	10	1191	11¾		
Fire clay.....	3	2	1195	1¾		
Sandy shale.....	9	2	1204	3¾		
Gray shale.....	10	11	1215	2¾		
Gray sandstone.....	16	8	1231	10¾		
Sandy shale.....	1	6	1233	4¾		
Gray sandstone.....	4	4	1237	8¾		
Dark shale.....	0	3½	1238	0¼		
Gray sandstone	4	2½	1242	2¾		
Gray sandstone with foreign sub-						
stances imbedded.....	0	8	1242	10¾		
Gray sandstone, streaked (very						
slaty)	19	11¼	1262	10		
Dark sandy shale.....	8	9	1271	7		

	Thickness.		Total.	
	Ft.	In.	Ft.	In.
Black slate.....	3	3	1274	10
Fire clay.....	3	1	1277	11
Dark sandy shale.....	14	1	1292	0
Gray sandy shale (slaty).....	45	5	1337	5
Dark, sandy shale (white streaks)..	2	4	1339	9
Soft white sand mixed with shale..	0	6	1340	3
Sandy shale.....	7	4	1347	7
Fire clay.....	0	10	1348	5
Sandy shale.....	2	4	1350	9
Soft white sandstone (crumbles)...	0	4	1351	1
Compact fine-grained hard sandstone	1	1	1352	2
Dark shale or slate.....	0	3	1352	5
Compact fine-grained hard sandstone	0	7½	1353	0½
Dark shale or slate.....	0	4	1353	4½
Hard siliceous sandstone (white)...	1	5	1354	9½
Dark shale or slate.....	0	0½	1354	10
Very hard siliceous sandstone (white)	0	7½	1355	5½
Very hard siliceous sandstone (light)	1	10	1357	3½
Hard grayish-white sandstone.....	5	4	1362	7½
Slate, black.....	0	0¼	1362	7¾
Hard grayish-white sandstone.....	0	6½	1363	2¼
Black slate.....	0	0¾	1363	3
Hard grayish-white sandstone.....	0	3½	1363	6½
Black slate.....	0	1½	1363	8
Very hard grayish-white sandstone to bottom of hole.....	14	5	1378	1 254' 4¼"

Reference to the original section will show that the coal classified as the Peerless Bench of the Campbell Creek in the present Report was correlated with the No. 2 Gas Bench, but as this coal seems too far above the Eagle to represent the No. 2 Gas the above change in names has been made. The number of the boring, also, has been changed to correspond to the Nicholas Map.

MEASURED SECTIONS, HAMILTON DISTRICT.

Hamilton District, the largest in the county, occupies the extreme northern end, next to Clay, Braxton, and Webster Counties. The tributaries of Elk and Birch Rivers, which drain its northern portion, have cut deep channels into the old peneplain, affording opportunity to secure long surface sections. The surface rocks range from the lower Conemaugh Series down through the Allegheny, and well into the Kanawha Group of the Pottsville.

The following section, measured with aneroid and arranged in descending order, starts at the top of a knob, 0.4 mile southeast of the mouth of Isom Branch of Robinson Fork of Buffalo Creek, and 3.3 miles northeast of Dade, and extends westward to Robinson Fork, some of the lower exposures being on the west side of that stream:

Isom Branch of Robinson Fork Section, Hamilton District.

	Thickness. Total.	
	Feet.	Feet.
Allegheny Series (260')		
Concealed with sandstone boulders.....	40	40
Bench, Lower Freeport Coal horizon (1735' B.) ...	40	40'
Concealed	10	50
Sandstone, massive, very pebbly, Lower Freeport	100	150
Concealed, with sandstone.....	60	210
Slate and coal blossom— Middle Kittanning (1565' B.).....	...	210
Concealed	50	260
Pottsville Series—Kanawha Group (360')		
Steep bank, with sandstone, Homewood	70	330
Bench, Upper Mercer Coal horizon (1445' B.) ...	...	330
Concealed	51	381
Coal, Stockton , (Prospect No. 276 on Map II; 1390' B.) fallen shut, reported.....	4	385
Concealed	95	480
Slate, black, Winifrede Coal horizon (1295' B.) ...	...	480
Concealed	30	510
Coal blossom, Chilton (reported, 0' 4"; 1265' B.) .....	...	510
Concealed	35	545
Coal , (reported 0' 4") Hernshaw (opposite side of creek) (1230' B.).....	...	545
Concealed	25	570
Bench, Williamson Coal horizon (0' 4" thick on opposite side of creek; 1205' B.).....	...	570
Concealed to Robinson Fork (1155' B.).....	50	620

The following section, prepared by Ray V. Hennen and published in a previous Report of the Survey⁴, is partly in Nicholas and partly in Clay Counties, Mr. Hennen's description (the number of the well and coal openings being changed to correspond to those shown on the Nicholas Map) being as follows:

"In the extreme eastern point of Buffalo District, Clay County, the following succession is obtained by combining a section measured with

⁴Ray V. Hennen, Braxton and Clay Report, W. Va. Geol. Survey, pp. 115-117; 1917.

aneroid from the summit of the high knob on the Clay-Nicholas County Line northeastward on the west hillside of Road Fork of Strange Creek via an opening in the 'No. 5 Block' (Lower Kittanning) Coal bed, with the log of the J. D. Cameron No. 2 (Elk River Coal & Lumber Company No. 1553) Well (No. 24 on Map II), located in Nicholas County on the north bank of Road Fork, 1.3 miles southeast of Dille. The well in question was completed in October, 1910, by the Hope Natural Gas Company and its record kindly furnished the Survey by the United Fuel Gas Company of Charleston, West Virginia, no showing of either oil or gas being reported."

Dille Section, Buffalo District, Clay County, and Hamilton District, Nicholas County.

	Thickness. Total.	
	Feet.	Feet.
Conemaugh Series (60')		
Concealed, mostly sandstone, in steep slope from summit of knob in County Line.....	60	60
Allegheny Series (340')		
Bench, Upper Freeport Coal horizon (1690' B.)	5	65
Sandstone, coarse-grained, brown, conglomeratic, Upper Freeport	85	150
Bench, slight, Lower Freeport Coal horizon ...	10	160
Concealed, steep slope, and sandstone, Lower Freeport	60	220
Bench, flat, Upper Kittanning Coal horizon ...	10	230
Concealed, mostly sandstone, in steep slope..	90	320
Bench, Middle Kittanning Coal horizon	5	325
Sandstone, grayish-white, making cliff, not pebbly, concealed, East Lynn	69	394
Coal, " No. 5 Block ," Lower Kittanning (1360' B.)	6	400
Pottsville Series (1285')		
Concealed to top of Well No. 24 on Map II....	40	440
Continued with Log of Elk River Coal & Lumber Company Well No. 1553:		
Conductor	16	456
Unrecorded	14	470
Sandstone	40	510
Slate	50	560
Sandstone	12	572
Slate	10	582
Sand, Upper Coalburg	18	600
Coal, Coalburg	6	606
Slate	57	663
Sand, Lower Coalburg	6	669
Lime	11	680
Sand, Upper Winifrede	25	705
Slate	10	715
Coal, Winifrede	7	722
Slate	8	730
Sand, Lower Winifrede	20	750
Slate	70	820
Lime	28	848
Sand	22	870
Slate	10	880

	Thickness.	Total.	
	Feet.	Feet.	
Lime	32	912	
Slate	28	940	
Lime	30	970	
Slate	20	990	
Lime	10	1000	
Sand	15	1015	
Slate	27	1042	
Sand	28	1070	
Lime	25	1095	
Sand	33	1128	
Slate	19	1147	
Lime	103	1250	
Sand	40	1290	
Slate	25	1315	
Sand	35	1350	
Lime	90	1440	
Sand	35	1475	
Lime	35	1510	
Slate	50	1560	
Sand	80	1640	
Slate	25	1665	
Sand	20	1685	963'
Mauch Chunk Series (370')			
Lime	27	1712	
Red rock	188	1900	
Slate	30	1930	
Lime	40	1970	
Red rock	30	2000	
Sand, Maxton	55	2055	370'
Greenbrier Limestone (85')			
Big Lime	85	2140	85'
Pocono Sandstones (109')			
Sand, Big Injun, to bottom of hole	109	2249	109'

The following section, measured with aneroid and arranged in descending order, starts at the top of a high knob 0.8 mile southeast of Wade, and extends northeastward via the church and school along the public highway to the head of Coalbed Run of Birch River, showing the greatest thickness of Conemaugh rocks found in the county:

Wade Section, Hamilton District.

	Thickness.	Total.
	Feet.	Feet.
Conemaugh Series (300')		
Shale, red, and sandstone, brown, Saltsburg	45	45
Concealed, with red shale and sandstone	80	125
Bench	...	125
Shale, red	35	160
Shale, sandy	5	165
Fire clay, streak, Brush Creek Coal horizon	...	165
(1540' B.)	...	165
Shale, red	30	195

	Thickness.	Total.
	Feet.	Feet.
Sandstone	5	200
Fire clay shale.....	5	205
Shale, sandy, and sandstone, shaly, Mahoning	95	300
Allegheny Series (120')		
Fire clay, Upper Freeport Coal horizon (1405' B.).....		300
Concealed	30	330
Sandstone, massive, coarse, pebbly, Upper Freeport	35	365
Concealed	55	420
Sandstone, massive, Lower Freeport , in bed of Coalbed Run.....		

The following section, measured with aneroid by Ray V. Hennen and published in a previous Report of the Survey⁵, starts at the summit of a high knob, 1 mile northeast of Herold, Braxton County, and extends southwestward along the highway to Birch River at the village, being about one mile and a half from the Nicholas line:

Herold Section (Northeast), Birch District, Braxton County.

	Thickness.	Total.
	Feet.	Feet.
Conemaugh Series (290')		
Shale, brown, from summit of knob.....	20	20
Sandstone, coarse, brown, pebbly, Grafton ...	35	55
Concealed	5	60
Shale, red and green...10' } Pittsburgh	20	80
Shale, red.....10' }		
Sandstone, green, Jane Lew	10	90
Concealed, mostly red shale.....	40	130
Sandstone, very hard, grayish-white, siliceous, Saltsburg	3	133
Concealed	3	136
Fire clay, flinty, red.....	4	140
Shale, red and variegated.....	25	165
Sandstone, green, coarse.....	10	175
Shale, sandy, red, and variegated.....	25	200
Spring, fire clay, horizon of Brush Creek Coal	5	205
Sandstone, green, fine-grained.....	10	215
Concealed and fire clay.....	5	220
Concealed	5	225
Sandstone, green, fine-grained.....	25	250
Concealed and fire clay.....	40	290
Allegheny Series (270')		
Sandstone, Upper Freeport , coarse-grained, brown, conglomeratic, pebbly in basal por- tion	70	360
Concealed	35	395

⁵Braxton and Clay Report, W. Va., Geol. Survey, pp. 84-85; 1917.

	Thickness. Total.		
	Feet.	Feet.	
Fire clay.....	1	396	
Sandstone, grayish-white and hard, Lower Freeport	24	420	
Concealed	40	460	170'
Sandstone, with shale layers, Upper East Lynn	15	475	
Concealed	45	520	60'
Shale, fire clay, dark, Middle Kittanning Coal horizon	5	525	
Sandstone, grayish-white, makes great cliff at Herold, East Lynn	30	555	
Coal, "No. 5 Block," Lower Kittanning (940' B.)	5	560	40'
Pottsville Series—Kanawha Group (55')			
Sandstone, Homewood , grayish-white, current-bedded, to bed of Birch River, at ford just below Herold.....	55	615	55'

The following section, measured with aneroid by Dr. I. C. White and published in a previous Report of the Survey⁶, and later republished with revisions by Ray V. Hennen⁷, starts at the south side of Herold and extends northward to Birch River near the village, being slightly more than a mile from the Nicholas line:

Herold Section (South), Birch District, Braxton County.

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Allegheny Series (224' 2")					
Sandstone, great pebbly cliff, (Upper Freeport)	50	0	50	0	
Concealed and sandstone.....	40	0	90	0	
Coal, (Upper Kittanning)	1	6	91	6	91' 6"
Shale, sandstone, and concealed....	80	0	171	6	80' 0"
Fire clay, visible, (Middle Kittanning Coal horizon at top).....	3	0	174	6	
Sandstone, massive, pebbly, East Lynn	45	0	219	6	
Slate, black.....	0	2	219	8	
Coal .....2' 0" } Shale, gray ...0 9 } ("No. 5 Block") Coal, soft....0 8 } Lower Kittanning Coal, splint ..0 6 } (945' B.) Coal, harder .0 7 }	4	6	224	2	52' 8"
Pottsville Series (50')					
Concealed and massive sandstone to bed of Birch River.....	50	0	274	2	50' 0"

⁶I. C. White, Vol. II(A), W. Va. Geol. Survey, p. 569; 1908.

⁷Ray V. Hennen, Braxton and Clay Report, W. Va. Geol. Survey, pp. 85-86; 1917.

The following section measured with aneroid and arranged in descending order, starts at the top of a high point, 0.5 mile west of Birch River Post-office, and extends north-eastward to Birch River just below the village. Being on the strike the recorded intervals represent approximately true vertical measurement:

Birch River Section, Hamilton District.

	Thickness. Total.	
	Feet.	Feet.
Allegheny Series (275')		
Sandstone, massive, with a few pebbles, Upper Freeport.....	35	35
Concealed	40	70
Black slate and fire clay, Lower Freeport Coal horizon .....	...	75
Sandstone, massive, buff, partly concealed in steep bluff, Lower Freeport, Upper East Lynn and East Lynn.....	115	190
Concealed	85	275
Pottsville Series—Kanawha Group (430')		
Concealed	35	310
Coal blossom, Upper Mercer? (1485' B.).....	...	310
Concealed	45	355
Sandstone and concealed.....	30	385
Coal blossom, Stockton (1410' B.).....	...	385
Concealed	72	457
Sandstone, massive, Upper Coalburg.....	15	472
Slate, black, 0' 3" (found one marine fossil). ...	...	472
Coal, with parting, (3' 2"). Coalburg (Mine No. 360 on Map II; 1320' B.).....	3	475
Shale and concealed in bluff.....	45	520
Bench .....	...	520
Concealed	90	610
Sandstone and concealed.....	60	670
Sandstone, flaggy, Hernshaw?.....	30	700
Concealed to Birch River (1090' B.).....	5	705

The following section, measured with aneroid and arranged in descending order, starts at the extreme northern end of Powell Mountain, between Powell Creek and Shant Branch of the same, and extends northeastward to the Grogg Spring School, 1.5 miles southwest of Birch River village. Being on the dip of the rocks, the recorded intervals are greater than true vertical measurement would show, the total dip from top to bottom amounting to about 100 feet, most of this, however, being in the concealed interval of 270 feet at the base:

Shant Branch Section, Hamilton District.

	Thickness.		Total.
	Feet.	Feet.	
Allegheny Series (355')			
Concealed and sandy shale.....	70	70	
Slate, black, Lower Freeport Coal horizon (1980' B.).....		70	70'
Concealed	5	75	
Sandstone, massive, cliff rock, Lower Freeport	60	135	
Concealed	1	136	
Coal prospect, Upper Kittanning (No. 34 on Map II; 1910' B.) reported 3' to.....	4	140	70'
Sandstone	20	160	
Concealed	15	175	
Sandstone and concealed.....	25	200	
Sandstone, massive, Upper East Lynn.....	75	275	
Shale, sandy.....	6	281	
Coal, splinty...1' 5" } Slate, black...0 4 } Coal .....0 5 } (4' 5") Middle Kittan- Coal, bony } ning (1765' B.); Pros- splint.....0 11 } pect No. 50 on Map II. Slate, black, } bony.....0 5 } Coal, soft.....0 11 }	4	285	145'
Sandstone, shaly and concealed.....	9	294	
Coal (0' 8" visible) (1755' B.).....	1	295	
Fire clay shale and concealed.....	15	310	
Coal prospect, reported "Big Vein," Lower Kittanning (No. 5 Block), fallen shut (1740' B.).....		310	25'
Concealed and sandy shale.....	41	351	
Coal .....0' 7" } Slate, black..0 4 } Coal, soft....2 1 } Clarion (4' 3") Prospect Slate, gray..0 5 } No. 215 on Map II; (1695' B.) 4 Coal .....0 4 } Shale, gray..0 2 } Coal .....0 4 }	4	355	45'
Pottsville Series—Kanawha Group (465')			
Shale, sandstone, and concealed.....	135	490	
Sandstone, massive, Upper Coalburg.....	7	497	
Coal ..1' 5" } (3' 0") Coalburg (1550' B.) Mine Bone..0 2 } No. 365 on Map II..... 3 Coal ..1 5 }	3	500	145'
Shale and concealed.....	10	510	
Sandstone, massive, (Lower Coalburg.....)	40	550	
Concealed, sandstone, and concealed to Grogg Spring Schoolhouse (1230' B.).....	270	820	

The following section, measured with aneroid by Dr. Price and the writer, starts at the top of a high point, 1 mile southeast of Birch River village and 0.5 mile southwest of the mouth of Anthony Creek, and extends northeastward to

the junction of that stream with Birch River. Being on the strike the recorded intervals represent approximately true vertical measurement:

Anthony Creek (Mouth) Section, Hamilton District.

	Thickness. Feet.	Total. Feet.	
Conemaugh Series (80')			
Concealed in bluff, with quartz pebbles, Ma- honing Sandstone	80	80	
Allegheny Series (300')			
Concealed in bench, Upper Freeport Coal horizon (2055' B.)	15	95	95'
Sandstone, massive, pebbly, Upper Freeport.	40	135	
Concealed in bench.....	30	165	
Sandstone, massive, buff, coarse, lower por- tion makes cliff, Lower Freeport and Upper East Lynn	105	270	
Concealed in bench.....	20	290	
Sandstone, massive, buff, coarse, East Lynn..	55	345	
Concealed	35	380	
Coal blossom, Lower Kittanning (No. 5 Block) (1770' B.)		380	285'
Pottsville Series—Kanawha Group (633')			
Sandstone, in steep bluff, partly concealed, Homewood	95	475	
Concealed in slope.....	55	530	
Coal blossom, Stockton (1620' B.)		530	150'
Concealed in steep bluff, with sandstone, Up- per Coalburg	57	587	
Shale, sandy	5	592	
Coal, } (3' 3") Coalburg (1550' B.) cannel.2' 11" } (Ballard Scott Mine—No. 370	3	595	65'
Coal, } on Map II) soft...0 4 }			
Concealed	155	750	
Bench		750	
Concealed in slope.....	85	835	
Sandstone, massive, Upper Cedar Grove	20	855	
Concealed	75	930	
Slate, black, and coal blossom, Peerless (1215' B.)		930	335'
Sandstone, massive, Brownstown	25	955	
Fire clay		955	
Concealed	20	975	
Sandstone, massive, Eagle?	30	1005	
Concealed to creek.....	8	1013	

The following section, measured with aneroid and arranged in descending order, starts at the top of a high ridge, 0.8 mile northeast of Anthony Creek School, and extends southwestward down the left fork of Mudlick Run and

thence to the point where the latter tributary empties into Anthony Creek. Being on the strike of the rocks the recorded intervals represent approximately true vertical measurement. It will be noted that the interval covered by the upper 220 feet of the section was not studied in detail and that there is a concealed interval of 325 feet near the basal portion, but the intermediate 360 feet had been prospected completely for coal by the Tioga Lumber Company, revealing practically all the coals that should be found in that portion:

Mudlick Run of Anthony Section, Hamilton District.

	Thickness.		Total.	
	Feet.	Feet.		
Conemaugh and Allegheny Series (363')				
Sandstone and concealed from top of knob...	220	220		
Sandstone, massive, Upper East Lynn.....	60	280		
Shale, dark.....	6	286		
Coal .....1' 9" } (4' 0") Middle Kittanning				
Niggerhead...0 3 } (1910' B.) Prospect No.	4	290	290'	
Coal.....1 3 } 52 on Map II.				
Slate and concealed.....	1	291		
Sandstone, massive.....	5	296		
Slate and sandy shale.....	4½	300½		
Sandstone, massive, East Lynn.....	32	332½		
Shale, sandy.....	4	336½		
Coal .....1' 9" } (8' 6") Lower Kittanning				
Shale, gray...3 0 } (No. 5 Block) (1855' B.)	8½	345	55'	
Coal, splint...3 9 } Prospect No. 156 on Map II				
Shale, concealed, and slate.....	12	357		
Coal.....0' 6" } (2' 9") Clarion (1840' B.)				
Slate, black.0 5 } Prospect No. 220 on Map II	3	360	15'	
Coal.....1 10 }				
Shale and concealed.....	3	363		
Pottsville Series—Kanawha Group (597')				
Sandstone, massive, Homewood.....	92	455		
Concealed	10	465		
Shale, sandy.....	2	467		
Coal, Stockton (1730' B.; Prospect No. 285 on Map II).....	3	470	110'	
Shale and concealed.....	12½	482½		
Sandstone, massive, Upper Coalburg.....	20	502½		
Coal, medium-hard...1' 11" } (3' 6") Coalburg				
Slate, black.....0 5 } (1695' B.) Prospect	3½	506	35'	
Coal, soft.....1 2 } No. 372 on Map II				
Shale and concealed.....	39	545		
Sandstone, massive, Upper Winifrede.....	35	580		
Concealed	25	605		
Coal blossom, at old prospect, Winifrede (1595' B.).....		605	99'	
Concealed	325	930		
Sandstone, massive, Decota?, to Anthony Creek (1240' B.).....	30	960		

In the following section the surface portion was measured with aneroid by Dr. Price and the writer, starting at the top of a high point, 0.6 mile northward from the mouth of Rich Fork and descending southwestward to Anthony Creek, 0.5 mile below the mouth of Rich Fork. The lower portion is the record of the **Tioga Lumber Company No. 2 (22) Coal Test**, located at the base of the measured section, and revealing the remainder of the Pottsville Series, as well as the top of the Mauch Chunk. Being on the strike the recorded intervals represent approximately true vertical measurement:

Rich Fork of Anthony Section, Hamilton District.

	Thickness.	Total.	
	Ft. In.	Ft. In.	
Allegheny Series (125')			
Sandstone, massive, coarse, cliff,			
East Lynn , capping point.....	55 0	55 0	
Concealed in slope.....	44 0	99 0	
Coal and slate. 2' 0" } (5' 8") Lower			
Coal.....1 10 } Kittanning (No.			
Slate, } 5 Block) Pros-	5 8	104 8	105'
dark, bony..0 4 } nect No. 158 on			
Coal.....1 6 } Map II (2020' B.)			
Concealed	20 4	125 0	
Pottsville Series—Kanawha Group (833' 9")			
Sandstone, massive, Homewood	115 0	240 0	
Concealed	17 0	257 0	
Bench, Stockton		257 0	152'
Concealed	23 0	280 0	
Sandstone, massive	10 0	290 0	
Coal prospect , fallen shut, Coalburg			
(1835' B.)		290 0	33'
Steep bluff with sandstone	107 0	397 0	
Concealed in slope	30 0	427 0	
Bench		427 0	
Sandstone in steep bluff, makes cliff			
at top	70 0	497 0	
Concealed	22 0	519 0	
Slate, black		519 0	
Concealed and shale	17 0	536 0	
Sandstone in bluff	33 0	569 0	
Concealed to bore hole	176 0	745 0	
Continued by Tioga Lumber Co. No. 2			
(22) Coal Test Record (1380' B.):			
Surface	12 0	757 0	
Shale, gray, sandy	44 0	801 0	
Slate, black	13 0	814 0	



PLATE VI.— Looking southeast from ridge one half mile northwest of Hominy Falls across valley of Hominy Creek toward Big Mountain, Greenbrier County; Topography mainly of New River Group; Kanawha Group covers top of Coggins Knob in right background.

Photo by E. E. Harris.

	Thickness.		Total						
	Ft.	In.	Ft.	In.					
Coal	2'	2"							
Fire clay, dark, sandy.	1	6	} Lower War Eagle	8	3	822	3	532'	3"
Sandstone, soft	3	6							
Coal	1	1							
Fire clay, dark				0	3	822	6		
Slate, gray				23	6	846	0		
Coal	0'	10"	} Gilbert	3	3	849	3	27'	
Fire clay	2	3							
Coal	0	2							
Fire clay				4	0	853	3		
Slate, gray, with some black				56	0	909	3		
Sandstone, hard, with coal spars...				2	9	912	0		
Slate, black				9	0	921	0		
Shale, sandy				4	0	925	0		
Sandstone, soft				6	3	931	3		
Shale, gray				3	9	935	0		
Shale, dark				0	6	935	6		
Shale, black, cannel, highly bitumi- nous, or very impure cannel coal				5	0	940	6		
Coal, slightly bony, Douglas				1	5	941	11	92'	8"
Bone				0	4	942	3		
Shale, black				2	5	944	8		
Slate, dark-gray				5	0	949	8		
Sandstone, hard, with coal spars...				0	10	950	6		
Shale, gray				1	0	951	6		
Sandstone, hard, with coal spars...				4	0	955	6		
Coal, Lower Douglas				0	10	956	4	14'	5"
Fire clay				2	5	958	9		
Pottsville Series—New River Group (360' 3")									
Sandstone, soft	31'	6"	} ..	37	6	996	3		
Sandstone, hard, with coal spars	6	0							
Fire clay, dark				1	3	997	6		
Shale, sandy				4	0	1001	6		
Shale, black				3	0	1004	6		
Shale, gray, sandy				47	0	1051	6		
Shale, gray				22	0	1073	6		
Fire clay				8	0	1081	6		
Shale, sandy				28	0	1109	6		
Sandstone, soft, Lower Nuttall....				26	0	1135	6		
Fire clay				5	0	1140	6		
Slate, black, with coal spars and several streaks of bony coal, Hughes Ferry				4	0	1144	6	188'	2"
Fire clay				1	6	1146	0		
Fire clay, sandy				3	0	1149	0		
Fire clay, very pure				2	5	1151	5		
Sandstone, soft				24	0	1175	5		
Shale, gray, sandy				12	0	1187	5		
Slate, dark				6	6	1193	11		
Coal, bony, Castle				0	4	1194	3	49'	9"
Shale, gray				7	5	1201	8		
Shale, sandy				4	2	1205	10		
Fire clay, sandy				1	4	1207	2		

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Slate, black	9	0	1216	2	
Coal, Sewell "B"	0	9	1216	11	22' 8"
Fire clay, impure	0	8	1217	7	
Sandstone, soft	11	6	1229	1	
Shale, sandy	4	3	1233	4	
Slate, dark-gray	1	6	1234	10	
Coal, Sewell	0	7	1235	5	18' 6"
Slate, black	4	1	1239	6	
Fire clay, impure	6	2	1245	8	
Slaty, gray	6	1	1251	9	
Shale, sandy	10	3	1262	0	
Slate, dark-gray	11	3	1273	3	
Slate, black	5	10	1279	1	
Coal, bony, Welch.....	0	2	1279	3	43' 10"
Fire clay, impure	2	7	1281	10	
Slate, black	2	0	1283	10	
Slate, dark-gray	3	2	1287	0	
Fire clay, impure	3	6	1290	6	
Coal, Fire Creek.....	0	2	1290	8	11' 5"
Fire clay, hard, sandy	11	7	1302	3	
Shale, gray	4	8	1306	11	
Slate, black	6	1	1313	0	
Fire clay	6	0	1319	0	
Mauch Chunk Series (15' 8")					
Shale, red	1	0	1320	0	
Slate, black	2	0	1322	0	
Fire clay, mottled with red shale...	7	4	1329	4	
Sandstone, soft, shaly.....	4	0	1333	4	
Shale, gray	0	4	1333	8	
Core left in hole	1	0	1334	8	

The following section, previously published by the Survey⁸, having been measured with hand-level and arranged in descending order, starts at the top of Crites Mountain, 0.8 mile north of Skyles, and descends to Birch River at Skyles village where Skyles Creek empties into the former stream. Being mostly on the strike of the rocks, the recorded intervals represent approximately true vertical measurement:

Skyles Section, Hamilton District.

	Thickness.		Total.	
	Feet.	Feet.	Feet.	Feet.
Conemaugh Series (53')				
Sandstone fragments, Lower Mahoning, capping Crites Mountain	15		15	
Concealed	33		48	
Shale, dark, Uffington.....	5		53	
Allegheny Series (262')				
Coal opening, fallen shut, (James Rose), Upper Freeport, reported.....	2		55	55'

⁸D. B. Reger, Webster Report, W. Va. Geol. Survey, p. 112; 1920.

	Thickness.		Total.
	Feet.	Feet.	
Sandstone, massive, coarse, Upper Freeport	18	73	
Concealed in bench	35	108	
Coal , reported in James Rose water well, Lower Freeport	2	110	55'
Sandstone, massive, coarse, great cliff, (slight break at 145'), Lower Freeport and Upper East Lynn	115	225	
Concealed	83	308	
Coal blossom , Lower Kittanning (1841' L.) visible	2	310	200'
Concealed and fire clay, Lower Kittanning ..	5	315	
Pottsville Series—Kanawha Group (575')			
Sandstone, massive, cliff, Homewood	40	355	
Concealed	45	400	
Sandstone, massive, Upper Coalburg (Upper Connoquenessing)	80	480	
Concealed in slope, mostly shale	45	525	
Sandstone, massive, Upper Winifrede	75	600	
Concealed in bench, Winifrede Coal horizon	10	610	300'
Steep bluff, with sandstone, Upper Chilton ..	40	650	
Bench, Chilton Coal horizon.....	..	650	40'
Concealed in bluff	60	710	
Sandstone, shaly, Peerless	20	730	
Concealed in bench, Alma Coal horizon	5	735	85'
Sandstone, massive, Monitor	20	755	
Shale, sandy	7	762	
(2' 11") Campbell			
Coal , cancell.... 0' 9" } Creek (Peerless			
Slate , black.... 0 2 } Bench) (1386' L.)	3	765	30'
Coal , soft..... 2 0 } Davis-Eakin Lumber Co. Opening			
Concealed	10	775	
Sandstone, shaly, Brownstown	65	840	
Shale, sandy	10	850	
Slate, black, horizon of Powellton Coal (1301' L.).....	..	890	85'
Concealed and sandstone, Eagle	40	890	
Coal prospect , Eagle (1261' L.); not much found .....	..	890	40'
Sandstone, massive, Decota , visible in Skyles Creek .....	..	890	

The following section, arranged in descending order, the surface portion of which was measured with hand-level by Dr. Price and the writer, starts at the top of the south end of Powell Mountain, and extends southwestward with the public highway to the mouth of Spruce Run of Muddlety Creek, one mile northeast of Hookersville. From this point it continues with the record of the **Henry McQueen No. 1 (23) Oil Test Well**, the same having been furnished the Survey by Mr. Leonard Harrison, of Wellsboro, Pennsylvania, a rep-

representative of the Nicholas Oil and Gas Company, which drilled the hole. Owing to the dip of the rocks the recorded intervals in the surface portion of the section are less than true vertical measurement would show, the total dip amounting to about 75 feet:

Hookersville Section, Hamilton District.

	Thickness. Feet.	Total. Feet.
Conemaugh Series (15')		
Sandstone and concealed from top of Powell Mountain	15	15
Allegheny Series (347')		
Coal blossom, Upper Freeport (2515' L.).....		15
Sandstone, massive, coarse, pebbly, Upper Freeport	103	118
Concealed	11	129
Slate, dark (0' 8")	1	130
Coal, (1' 1"), Lower Freeport (2399' L.).....	1	131
Fire clay and concealed.....	6	137
Sandstone, massive, coarse, partly concealed, Lower Freeport.....	77	214
Concealed	11	225
Coal blossom, Upper Kittanning (2305' L.)... ..		225
Sandstone, massive, Upper East Lynn.....	49	274
Fire clay shale and concealed.....	18	292
Coal, splinty.... 1' 5" } (3' 11") Middle Kit-		
Slate, bony..... 0 3 } tanning; Mine No.		
Coal, splinty.... 1 5 } 65 on Map II.	4	296
Coal, medium-soft 0 10 } (2234' L.)		
Fire clay shale	2	298
Sandstone, East Lynn.....	15	313
Concealed	18	331
Coal and slate mixed, Lower Kittanning (No. 5 Block) (2190' L.).....	9	340
Fire clay and sandy shale.....	22	362
Pottsville Series—Kanawha Group (788')		
Sandstone, massive, coarse, Homewood.....	60	422
Concealed	3	425
Coal 0' 9" } (2' 5") Stockton "A" (Up-		
Shale, gray 0 3 } per Mercer); Exposure	2	427
Coal 1 5 } No. 251 on Map II;		
(2103' L.)		
Fire clay and sandy shale	16	443
Sandstone, massive	11	454
Concealed	21	475
Sandstone	11	486
Concealed and shale	2	488
Coal 0' 2" } (0' 7") Stockton (2041' L.)		
Shale, gray 0 3 }	1	489
Coal 0 2 }		
Sandstone, Upper Coalburg	19	508
Concealed	9	517
Slate, black, with plant and marine? fossils, Coalburg	5	522

	Thickness. Feet.	Total. Feet.	
Coal, (0' 8"), Coalburg (2007' L.).....	1	523	34'
Sandstone, massive, coarse, soft, Lower Coalburg	20	543	
Fire clay	1	544	
Shale, sandy	16	560	
Shale, black, with <i>Naiadites</i> and <i>Lingula</i> fos- sils, Winifrede	5	565	
Coal, (0' 6"), Chilton, (1964' L.).....	1	566	43'
Fire clay shale	3	569	
Shale, sandy, with sandstone.....	8	577	
Shale, dark	21	598	
Sandstone, massive, soft, coarse, gray, Hern- shaw	25	623	
Iron ore, streak .....	..	623	
Shale, sandy	22	645	
Concealed and alluvium to well.....	20	665	
Continued by Henry McQueen No. 1 (23) Well Record (1865' L.):			
Clay, yellow	5	670	
Slate, black	5	675	
Coal, Cedar Grove?	2	677	111'
Slate and sand	63	740	
Slate and shell	205	945	
Sand, white and hard, Gilbert, etc.	190	1135	
Slate, black, soft, Douglas	15	1150	
Pottsville Series—New River Group (490')			
Sand, white, hard, Upper and Lower Nuttall	115	1265	
Coal, Hughes Ferry	5	1270	593'
Sand, white, hard	20	1290	
Slate, black, soft	175	1465	
Coal, Sewell	4	1469	199'
Slate, soft	5	1474	
Coal, Welch	5	1479	10'
Sand, white, hard, Rosedale Salt?, Upper Raleigh (gas at 830'; water at 835').....	41	1520	
Slate, black, soft	15	1535	
Sand, white, hard, Lower Raleigh?.....	105	1640	
Mauch Chunk Series (585')			
Red rock, soft	145	1785	
Slate and shell	130	1915	
Red rock	190	2105	
Sand, gray, hard, Maxton	60	2165	
Slate, soft	60	2225	746'
Greenbrier Series (300')			
Lime, hard ... 30' } Big Lime (a little gas			
Sand and lime. 270 } at 1700')	300	2525	
Pocono Series (640')			
Sand, white, hard, Big Injun, (a little gas at 1920')	65	2590	
Slate and shell	125	2715	490'
Sand, hard, Squaw (oil show, 2110').....	125	2840	
Slate, soft, to bottom.....	325	3165	
Conductor, 12'; 10" casing, 76'; 8" casing, 625'; 6" casing, 900'; 5" liner at 1560', 123'; Total depth of well 2500'.			

The following section, measured with aneroid and arranged in descending order, starts at the top of a high ridge, 1.2 miles west of Muddlety Post-office, and extends south-eastward down the public highway to the foot of the hill on Trout Run of Muddlety Creek. Owing to the dip of the rocks the recorded intervals are less than true vertical measurement would show, the total dip being about 50 feet:

Muddlety Section, Hamilton District.

	Thickness. Total.	
	Feet.	Feet.
Allegheny Series (295')		
Sandstone, massive, coarse, Upper Freeport	60	60
Concealed	10	70
Bench, Lower Freeport Coal horizon .....	..	70
Sandstone, massive, partly concealed, makes cliff	120	190
Concealed, with sandy shale	45	235
Sandstone, massive	5	240
Concealed	25	265
Coal blossom, heavy, Lower Kittanning (No. 5 Block) (2120' B.).....	..	265
Concealed	30	295
Spring, Clarion Coal horizon .....	..	295
Pottsville Series—Kanawha Group (180')		
Sandstone, and concealed, Homewood	80	375
Concealed	40	415
Sandstone, Upper Coalburg	40	455
Concealed to foot of hill (1910' B.).....	20	475

The following section, measured with aneroid by Dr. Price and the writer, starts at the top of a ridge, 0.5 mile northeast of Persinger Ford, and descends southwestward with the public highway to Gauley River at the ford. Being almost on the strike of the rocks the recorded intervals represent approximately true vertical measurement:

Persinger Ford (North) Section, Hamilton District.

	Thickness. Total.	
	Feet.	Feet.
Pottsville Series—Kanawha Group (210')		
Shale, sandy, with fire clay, Lower War Eagle		
Coal horizon	15	15
Sandstone, massive, Lower Gilbert	35	50
Concealed	5	55
Coal blossom, Gilbert (2055' B.).....	..	55
Shale, sandy	60	115
Concealed	25	140

	Thickness.	Total.	
	Feet.	Feet.	
Shale, dark, with Naiadites, etc., Douglas....	60	200	
Fire clay, Lower Douglas Coal horizon (1910' B.).....		200	145'
Shale, sandy.....	10	210	
Pottsville Series—New River Group (240')			
Sandstone, massive, Upper Nuttall.....	70	280	80'
Shale, sandy.....	50	330	
Sandstone, massive, pebbly, partly concealed, Lower Nuttall, to Gauley River, (1660' B.).	120	450	170'

MEASURED SECTIONS, BEAVER DISTRICT.

Beaver District occupies the eastern end of the county, being east of Hamilton District and next to the Webster County Line. Its surface rocks range from the lower portion of the Conemaugh Series, which occurs in the hilltops of the northern portion, down through the Allegheny Series, the Kanawha Group, and well into the New River Group of the Pottsville.

The following section, measured with aneroid and arranged in descending order, starts about one-third mile east of Beaver village, and extends westward along the public highway to the village and thence southward for one-fourth mile down Beaver Creek, ending at the level of the **A. J. Pettigrew No. 1 (24) Coal Test**, the record of which the Survey has not been able to obtain:

Beaver Section, Beaver District.

	Thickness.	Total.	
	Feet.	Feet.	
Pottsville Series—Kanawha Group (205')			
Shale, sandy.....	45	45	
Slate, dark.....		45	
Shale, sandy.....	18	63	
Slate and coal blossom, Cedar (2245' B.)....	2	65	65'
Shale, sandy, Eagle?.....	5	70	
Sandstone, massive, Lower War Eagle, and shale.....	10	80	
Coal blossom, Lower War Eagle (2230' B.)..		80	15'
Fire clay and shale.....	5	85	
Sandstone, massive, hard, white, Gilbert....	30	115	
Slate, dark.....	15	130	
Sandstone, shaly.....	15	145	
Shale, sandy.....	7½	152½	
Coal, slaty...0' 6" } (2' 6") Gilbert (2155' B.)	2½	155	75'
Coal, soft....2 0 } Mine No. 973 on Map II.			

	Thickness. Total.	
	Feet.	Feet.
Fire clay and concealed.....	20	175
Sandstone, massive, Dotson , to bore hole (24)	30	205

In the following section, which is partly in Nicholas and partly in Webster County, and which has been previously published by the Survey⁹, the surface portion was measured with hand-level and arranged in descending order, and the lower portion is the record of an oil test well. The section starts at the top of Cottle Knob, situated on a high ridge that reaches to a height of 800 feet above the level of the Cottle Glades, in the edge of Nicholas County, 2.8 miles southwest of Camden-on-Gauley, and descends eastward to the foot of the mountain at the head of Barn Run, a total vertical measurement of 815 feet. From this locality the measures were carefully traced eastward to a point on the Cowen Road, one mile northeast of Camden-on-Gauley, where the same strata outcrop, and the measurement is continued southeastward along the road to the mouth of Coon Creek, which empties into Gauley River at the town named, the same being recorded in the section between 815 and 1125 feet. The lower portion of the section is the record of the **J. N. Camden No. 1 (28) Oil Test Well**, drilled by Hon. J. N. Camden in 1898, the result being a dry hole. After the section was finished an additional trip was made over the entire surface portion in company with Ray V. Hennen, to whom credit is due for certain identifications in the Kanawha and New River Groups:

**Camden-on-Gauley Section, Beaver District, Nicholas, and
Glade District, Webster County.**

	Thickness. Total.	
	Feet.	Feet.
Allegheny Series (225')		
Sandstone, massive, coarse, pebbly, capping		
Cottle Knob, Upper Freeport	50	50
Concealed in bench.....	20	70
Sandstone, massive, coarse, cliff rock, Lower		
Freeport and East Lynn	90	160
Concealed and slate.....	24	184

⁹D. B. Reger, Webster Report, W. Va. Geol. Survey, pp. 113-16; 1920.

	Thickness. Feet.	Total Feet.	
Coal, medium-hard 4' 0" } (5' 8") Lower Kittanning (2845' B.) Williams	6	190	190'
Coal, hard, splinty 1 8 } Heirs Mine (Mine No. 194 on Map II).			
Shale and concealed	35	225	
Pottsville Series—Kanawha Group (966')			
Sandstone, Homewood , and concealed in steep bluff	80	305	
Concealed in slope	40	345	
Bench, with coal fragments, Stockton (2690') . . .		345	155'
Concealed in bluff	60	405	
Bench		405	
Sandstone in steep bluff, partly concealed, Upper Winifrede	67	472	
Shale, sandy	10	482	
Coal, soft . . 0' 8" } (3' 3") Winifrede (2550' B.);			
Slate, bony . . 0 3 } John Woods Mine, (Mine No. 430 on Map II)	3	485	140'
Coal, soft . . 0 7 } (3' 9") Eagle (2255' B.) John Woods Mine (Mine No. 840 on Map II)	4	780	89'
Bone 0 2 } (2' 1") Lower War Eagle.	2	895	25'
Coal, hard . . 0 11 } (2' 1") Lower War Eagle.	2	895	25'
Coal, soft . . 0 8 } (2' 1") Lower War Eagle.	2	895	25'
Concealed in steep bank, mostly sandstone . . .	88	573	
Black slate and coal blossom, Chilton (reported 2' 4")	2	575	90'
Concealed	102	677	
Coal blossom, at old prospect, Campbell Creek (Peerless Bench)		677	102'
Concealed	13	690	
Coal, (0' 9" visible), Campbell Creek (No. 2 Gas)	1	691	14'
Concealed	82	773	
Sandstone, shaly, Eagle	2	775	
Slate, black	1	776	
Coal, soft . . 1' 6" } (3' 9") Eagle (2255' B.) John Woods Mine (Mine No. 840 on Map II)	4	780	89'
Slate, bony . . 0 7 } (3' 9") Eagle (2255' B.) John Woods Mine (Mine No. 840 on Map II)	4	780	89'
Coal, soft . . 1 8 } (3' 9") Eagle (2255' B.) John Woods Mine (Mine No. 840 on Map II)	4	780	89'
Sandstone	25	805	
Concealed	10	815	
Coal, streak (2220')		815	35'
(Continued by measurements northeast of Camden-on-Gauley):			
Shale, sandy	35	850	
Coal blossom, Little Eagle		850	
Shale, dark, Eagle	20	870	
Slate, black, Little Cedar Coal horizon		870	55'
Sandstone, shaly, Lower War Eagle	10	880	
Shale, sandy	13	893	
Coal 0' 10 " } (2' 1") Lower War Eagle.	2	895	25'
Shale, gray . . 0 4 } (2' 1") Lower War Eagle.	2	895	25'
Coal 0 2½ } (2' 1") Lower War Eagle.	2	895	25'
Shale, gray . . 0 2½ } (2' 1") Lower War Eagle.	2	895	25'
Coal 0 1 } (2' 1") Lower War Eagle.	2	895	25'
Shale, dark . . 0 1 } (2' 1") Lower War Eagle.	2	895	25'
Coal 0 4 } (2' 1") Lower War Eagle.	2	895	25'

	Thickness.		Total.
	Feet.	Feet.	
Shale, sandy.....	45		940
Concealed	10		950
Sandstone, shaly at top, partly concealed, makes great cliff southwest of town, Lower Gilbert	35		985
Coal , supplied from S. H. Fleming mine on Coon Run, (2' 0"), Gilbert	2		987
Concealed	7		994
Sandstone, massive, coarse, gray, Dotson	60		1054
Shale, sandy.....	16		1070
Slate, dark.....	8		1078
Fire clay streak, Douglas "A" Coal horizon			1078
Shale, sandy.....	14		1092
Concealed	17		1109
Sandstone, massive, and concealed to well... ..	16		1125
Continued by record of J. N. Camden No. 1 (28) Well (2020' L.):			
Sand, brown, soft.....	23		1148
Gravel, brown, soft.....	2		1150
Slate, black, soft.....	6		1156
Sand, gray, hard.....	4		1160
Coal , soft, Douglas	3		1163
Sand, white, hard, Lower Dotson	5		1168
Slate, black, soft, Douglas	8		1176
Sand, black, hard.....	9		1185
Coal , soft, Lower Douglas	1		1186
Slate, brown, soft.....	5		1191
Pottsville Series—New River Group (634')			
Sand, fine, gray, hard.....16' } Slate, white, soft..... 6 } Sand, black, hard.....12 } Upper Nuttall. 54 1245 Shale, black, sandy, hard.10 } Sand, black, hard.....10 }			
Slate, black, soft.....	40		1285
Coal , soft.....	2		1287
Sand, gray, pebbly, very hard, Lower Nuttall	92		1379
Slate and shale, soft.....	13		1392
Slate, black, soft, Hughes Ferry Coal horizon	11		1403
Slate, black, sandy, hard.....	38		1441
Slate, gray, soft.....	10		1451
Sand, white, fine, hard, Harvey	39		1490
Slate, black, soft, Sandy Huff	18		1508
Sand, white, hard, Guyandot	17		1525
Coal , soft, Sewell "B"	5		1530
Sand, white, hard, Lower Guyandot	20		1550
Slate, black, soft, Hartridge	33		1583
Coal , soft, Sewell	1		1584
Sand, gray, fine, hard, Welch	10		1594
Slate, black, soft.....	51		1645
Coal , soft, Welch	5		1650
Slate, black, soft.....	5		1655

	Thickness.	Total.	
	Feet.	Feet.	
Sand, black, hard...10'	} Upper Raleigh (Sharon?) Rosedale Salt Sand	66	1721
Sand, white, hard... 6			
Sand, brown, soft...10			
Sand, white, soft... 5			
Sand, brown, hard...35			
Slate, white, soft.....	5	1726	
Shale, sandy, gray.....	20	1746	
Coal, soft, Fire Creek.....	3	1749	99'
Sand, white, hard, Pineville.....	47	1796	
Slate, gray, soft.....	13	1809	
Slate, white, soft.....	5	1814	
Sand, white, hard, base of Pottsville.....	11	1825	
Mauch Chunk Series (948')			
Shale, red.....	2	1827	
Sand, gray, very hard....20'	} Princeton	98	1925
Sand, white, very hard....10			
Sand, black, very hard....43			
Sand, gray, very hard....25			
Shale, sandy, dark, soft.....	5	1930	
Sand, black, hard.....	10	1940	
Shale, red, soft.....	47	1987	
Shale, sandy, soft, greenish-gray.....	58	2045	
Slate, dark-gray, soft.....	7	2052	
Limestone, blue, hard.....	6	2058	
Shale, red, soft.....	37	2095	
Limestone, dark, slaty, soft.....	43	2138	
Slate, red, soft.....	75	2213	
Limestone, gray, siliceous, hard.....	47	2260	
Shale, red, soft.....	4	2264	
Sand, blue, hard.....	31	2295	
Shale, red, soft.....	10	2305	
Sand, blue, hard.....	25	2330	
Shale, red, soft.....	20	2350	
Sand, red, hard.....	5	2355	
Shale, red, soft.....	150	2505	
Sand, red, hard.....	5	2510	
Shale, red, soft.....	75	2585	
Limestone, gray, hard... 5' } Hinton.....	57	2642	
Limestone, dark, slaty...52 }			
Limestone, black, hard.....	31	2673	
Slate, dark, limy, soft.....	12	2685	
Shale, gray, sandy, hard.....	10	2695	
Shale, dark, sandy, soft.....	60	2755	
Limestone, gray, siliceous, very hard, Little Lime	3	2758	
Slate, dark-gray, soft, Pencil Cave.....	15	2773	848'
Greenbrier Limestone (302')			
Limestone, black, hard.. 82'	} Big Lime.....	302	3075
Limestone, white, hard.. 23			
Sand, gray, very hard... 2			
Limestone, gray, hard... 4			
Sand, white, very hard.. 21			
Limestone, white, hard..170 }			

	Thickness. Feet.	Total. Feet.	
Pocono Sandstones (551')			
Sand, gray, very hard.... 8' }	} Big Injun..... 208	3283	
Sand, brown, hard..... 10			
Sand, gray, hard.....190			
Slate, black, soft.....	230	3513	
Sand, gray, soft, Weir?.....	5	3518	
Shale, dark, soft.....	77	3595	822'
Sand, hard, gray, Berea?.....	10	3605	
Shale, dark-gray, soft.....	21	3626	

The following section, measured with aneroid and arranged in descending order, starts at the top of the plateau, 1.2 miles northwest of Cranberry Station, and extends south-eastward along the public highway to Cranberry, where the Sewell Coal has been prospected just above drainage and the Welch is reported as having been found in the river bed at the abutments of the railroad bridge across Cranberry River at its junction with Gauley. Owing to the rapid rise of the rocks the recorded intervals are much less than true vertical measurement would show, the total rise being almost 125 feet over the line of traverse:

Cranberry Section (West), Beaver District.

	Thickness. Feet.	Total. Feet.	
Pottsville Series—Kanawha Group (330')			
Sandstone, massive, Lower Gilbert.....	40	40	
Concealed and sandy shale.....	32	72	
Shale, gray.....	1½	73½	
Coal, slaty.....0' 4" } (1' 6") Gilbert	} James Ward Mine	75	
Coal, medium-hard, columnar .....1 2 } No. 975 on Map II.			
Shale, concealed, and sandstone, Dotson, in bluff	60	135	
Bench	5	140	
Concealed	60	200	
Sandstone, massive, Lower Dotson.....	25	225	
Concealed	15	240	
Coal blossom, Lower Douglas (2235' B.).....	240	165'	
Concealed, with sandstone and shale.....	90	330	
Pottsville Series—New River Group (245')			
Sandstone, massive, pebbly, Upper Nuttall...	30	360	
Concealed	5	365	
Coal blossom (2110' B.).....	...	365	125'
Sandstone, massive, partly concealed, Lower Nuttall	70	435	
Slate, black.....	...	435	
Sandstone, shaly, Harvey.....	35	470	
Slate, dark, sandy, Sandy Huff.....	4	474	

	Thickness.		Total.
	Feet.	Feet.	
Coal, (visible 1' 3"), Castle (2000' B.).....	1	475	110'
Sandstone, massive, Guyandot	55	530	
Concealed	22	552	
Coal .....0' 1" } (3' 3") Sewell (1920' B.)			
Slate, black...1 4 } (Prospect No. 1156 on	3	555	80'
Coal , soft, } Map II)			
columnar ...1 10 }			
Concealed	20	575	
Coal , reported in river at bridge abutments,			
Welch (1900' B.).....		575	20'

The following section, measured with aneroid and arranged in descending order, starts at the top of the plateau, 1.5 miles southeast of Cranberry Station, and extends northwestward down the public highway to the village named, the Sewell and Welch Coals included in the basal portion being the same exposures as recorded in the Cranberry Section (West) above published. Owing to the rapid southeastward rise of the rocks the recorded intervals on this side of the river are much greater than true vertical measurement would show, the total rise over the line of traverse amounting to about 225 feet:

Cranberry Section (Southeast), Beaver District.

	Thickness.		Total.
	Feet.	Feet.	
Pottsville Series—Kanawha Group (175')			
Sandstone, Lower Gilbert (top, 2735' B.).....	105	105	
Concealed	40	145	
Sandstone, massive, Lower Dotson , and concealed	30	175	
Fire clay and coal blossom, Lower Douglas (2560' B.).....		175	175'
Pottsville Series—New River Group (660')			
Concealed (should contain Upper Nuttall Sandstone)	100	275	
Shale, dark.....	74	349	
Coal , slaty, laeger " B " (2385' B.).....	1	350	175'
Shale, dark.....	2	352	
Sandstone, massive, Lower Nuttall	25	377	
Shale, dark, partly concealed.....	73	450	
Concealed	30	480	
Coal blossom , laeger (Hughes Ferry) (2255' B.) ..		480	130'
Dark shale and fire clay.....	40	520	
Sandstone, shaly, Middle laeger	20	540	
Concealed and sandstone.....	24	564	
Coal (0' 10"), Lower laeger (2170' B.).....	1	565	85'

	Thickness. Total.		
	Feet.	Feet.	
Shale, sandy.....	20	585	
Fire clay and sandy shale.....	35	620	
Coal blossom, Castle (2115' B.).....		620	55'
Shale, sandy.....	55	675	
Concealed	25	700	
Sandstone, massive, Lower Guyandot.....	80	780	
Concealed and shale.....	32	812	
Coal .....0' 1" } (3' 3") Sewell (1920' B.)			
Slate, black....1 4 } Prospect No. 1156 on	3	815	195'
Coal, soft, } Mad II			
columnar ...1 10 }			
Concealed	20	835	
Coal, reported in river at bridge abutments, Welch (1900' B.).....		835	20'

MEASURED SECTIONS, RICHWOOD DISTRICT.

Richwood District occupies a small triangular area of 18.38 square miles, surrounding the town of Richwood, and being almost in the extreme eastern end of the county, next to Greenbrier. Its surface rocks range from the lower portion of the Kanawha Group down through the entire New River Group of the Pottsville and into the upper portion of the Mauch Chunk Series.

The following section, measured with aneroid and arranged in descending order, starts at the top of the plateau, 1 mile northwest of Richwood, and extends southeastward along the public highway to the Cherry River bridge in Richwood. Owing to the eastward rise of the rocks in that vicinity the recorded intervals are slightly less than true vertical measurement would show, the total rise over the line of traverse being about 75 feet. It will be noted from the section that the intervals in the upper portion of the New River Group, between the base of the Lower Guyandot and the top of the Upper Nuttall Sandstones, are greater than found elsewhere in the county, there being a considerable thickening of the dark shale beds between the various sandstones and coals:

Richwood Section, Richwood District.

Pottsville Series—New River Group (760')	Thickness. Total.	
	Feet.	Feet.
Sandstone, massive, Upper Nuttall, from top of ridge	65	65

	Thickness. Total.	
	Feet.	Feet.
Shale, dark	5	70
Sandstone, massive, coarse, cliff rock, Lower Nuttall	85	155
Fire clay shale, Hughes Ferry Coal horizon (2930' B.) .....	...	155
Shale, dark	55	210
Concealed, sandstone, shaly, and shale, dark, in steep bluff	118½	328½
Coal, soft, columnar, Castle (1' 5"; 2755' B.; Prospect No. 1126 on Map II)	1½	330
Concealed and shale	30	360
Sandstone, Guyandot	10	370
Shale, sandy	4½	374½
Coal blossom (0' 6" visible), Sewell "B" (2710' B.)	0½	375
Shale, sandy	35	410
Coal blossom, Sewell "A" (2675' B.) .....	...	410
Shale, sandy, partly concealed	60	470
Sandstone, massive, coarse, cliff rock, Lower Guyandot (2565' B.)	50	520
Concealed	15	535
Shale, dark	30	565
Concealed	40	605
Sandstone, Upper Raleigh	35	640
Concealed	68½	708½
Coal, Fire Creek , reported	1½	710
Concealed	20	730
Sandstone, partly concealed in bluff, Pineville	30	760
Mauch Chunk Series (140')		
Concealed, with reds, to Cherry River (2185' B.)	140	900

The following section, previously published by the Survey¹⁰, and having been measured with aneroid and arranged in descending order, starts at the top of a high mountain spur, 0.8 mile northwest of Dogway, Webster County, and extends eastward to Dogway Fork of Cranberry River about one-half mile north of the village. Owing to the rise of the rocks, intervals are slightly less than true vertical measurement would show, there being a total rise of 30 to 35 feet over the line of traverse. At the time the section was made the mountain was covered with snow and numerous details may have escaped notice, some of which have been later secured and added:

¹⁰D. B. Reger, Webster Report, W. Va. Geol. Survey, pp. 121-2; 1920.

Dogway Section, Glade District, Webster County.

	Thickness.		Total.
	Feet.	Feet.	
Pottsville Series—Kanawha Group (300')			
Sandstone, massive, Grapevine? (3875' B.)....	35	35	
Concealed in slope.....	250	285	
Bench, Lower Douglas Coal horizon (3610' B.)	15	300	300'
Pottsville Series—New River Group (580')			
Sandstone, massive, cliff rock, coarse, Upper Nuttall	35	335	
Bench	25	360	
Sandstone, massive, pebbly, cliff rock, Lower Nuttall (3510' B.).....	40	400	100'
Concealed	160	560	
Bench, Castle Coal horizon (3350' B.).....		560	160'
Sandstone, massive, Guyandot	25	585	
Concealed	60	645	
Sandstone, massive, Lower Guyandot	25	670	
Bench, with black slate, Sewell Coal horizon (3190' B.)		670	110'
Concealed, with black slate	80	750	
Shale, sandy, and concealed	44	794	
Sandstone, shaly, Lower Raleigh?	30	824	
Coal, Beckley	1½	825½	
Shale, sandy, Quinnimont	20	845½	
Coal, Fire Creek; Cherry River Boom & Lumber Co. Mine (No. 1273 on Map II) (3060' B.)	4½	850	180'
Concealed and sandy shale to Dogway Fork.	30	880	

In the following section, arranged in descending order, and having been previously published by the Survey¹¹, the surface portion was measured with aneroid, starting at the top of the Big Spruce Knob, Edray District, Pocahontas County, 6.5 miles northwest of Marlinton, and descending southwestward, along the strike of the rocks, to Williams River, where it connects with the record of the **Pocahontas Coal & Land Company No. 1 Oil Test Well**, drilled by that company on its own land, the record being furnished by Mr. Hubert Echols, of Marlinton, an official of the company, who kindly acted as guide when the section was measured. The section not only gives valuable information regarding the oil sands in this locality, and presumably also in eastern Nicholas, but also furnishes a complete vertical measurement of the Mauch Chunk Series with a total thickness of 1877 feet, at a point 12 to 14 miles northeast of the eastern cor-

¹¹D. B. Reger, Webster Report, W. Va. Geol. Survey, p. 123; 1920.

ner of Nicholas County, and records a remarkable showing of coal in that series, the same being much greater than anything hitherto reported elsewhere in the same group in the State, as it usually contains no coal at all:

Big Spruce Knob Section, Edray District, Pocahontas County.

	Thickness. Feet.	Total. Feet.	
Pottsville Series—New River Group (40')			
Sandstone, massive, pebbly, Raleigh (Sharon) capping Big Spruce Knob	40	40	40'
Mauch Chunk Series (1877')			
Concealed and sandstone.....	150	190	
Concealed, with reds	90	280	
Sandstone, massive, cliff rock, Princeton	40	320	280'
Concealed, with reds, in steep slope.....	110	430	
Bench .....	..	430	
Concealed, with reds, in steep slope	120	550	
Bench .....	..	550	
Shale, red, partly concealed	500	1050	
Sandstone, flaggy, green, Big Spruce Knob ..	30	1080	
Shale, gray, Big Spruce Knob , 2' to.....	0	1080	
Coal, Big Spruce Knob , (3615' B.); fallen shut, reported 4' 10'.....	5	1085	765'
Concealed and sandstone to level of well....	225	1310	
Continued by Pocahontas County Coal & Land Co. No. 1 Well (3390' B.):			
Unrecorded	180	1490	
Lime formation, Hinton	50	1540	455'
Unrecorded	377	1917	377'
Greenbrier Limestone (546')			
Big Lime	546	2463	
Pocono Series (659')			
Unrecorded	164	2627	
Sand, Big Injun , (oil show?)	145	2772	
Red rock	101	2873	
Unrecorded	5	2878	
Sand, Squaw?	104	2982	
Red rock	109	3091	1174'
Sand, white, Berea?	31	3122	
Catskill Series (730')			
Sand, broken	146	3268	
Shale	50	3318	
Sand, good, Fifty-foot and Thirty-foot?	245	3563	
Slate	19	3582	
Red rock	64	3646	555'
Sand, Gordon?	36	3682	
Slate	12	3694	
Sand, Fourth?	60	3754	
Slate	13	3767	121'
Sand, Fifth?	85	3852	
Chemung Series (490')			
Slate and shell to bottom	490	4342	

MEASURED SECTIONS, KENTUCKY DISTRICT.

Kentucky District occupies the main portion of the southeastern corner of the county, being south of Gauley River and east of Wilderness District, and adjoining the Greenbrier County Line. Its surface rocks include the basal portion of the Kanawha Group which is present in the high ridges and almost the entire New River Group of the Pottsville Series, Cherry River having cut nearly to the base of the latter group in the vicinity of Fenwick.

The following section, measured with aneroid and arranged in descending order, starts at the top of the plateau, 1 mile southwestward from Fenwick, and extends northeastward with the public highway to Cherry River at the town named, some of the New River coals having been observed at points slightly farther down the river and inserted at the proper horizons. Being practically on the strike of the rocks the recorded intervals show approximately true vertical measurement:

Fenwick Section, Kentucky District.

	Thickness.	Total.	
	Feet.	Feet.	
Pottsville Series—Kanawha Group (70')			
Sandstone, massive, pebbly, Lower Gilbert ,			
caps knob	20	20	
Concealed, with shale, (2890' B.).....	50	70	70'
Pottsville Series—New River Group (785')			
Sandstone, Upper Nuttall	80	150	
Concealed	45	195	
Sandstone, massive, Lower Nuttall (2710' B.).	55	250	
Shale, dark	30	280	
Coal blossom, Hughes Ferry (2680' B.).....	30	280	210'
Shale, dark, partly concealed	220	500	
Concealed	45	545	
Spring, Sewell "B" Coal horizon	--	545	265'
Concealed and sandstone, Lower Guyandot ...	60	605	
Coal opening, abandoned, Sewell (2355' B.)... ..	..	605	60'
Concealed	19	624	
Coal (0' 8"), Welch	1	625	20'
Concealed	70	695	
Shale, sandy	5	700	
Coal (0' 5"), Beckley.....	..	700	75'
Concealed	68	768	
Slate, black.....	5	773	
Coal, slaty. 1' 0" } (2' 1") Fire Creek Pros-			
Shale, gray. 0 7 } pect No. 1275 on Map II... ..	2	775	75'
Coal	0 6 }		
Concealed to Cherry River at Fenwick.....	80	855	

The following section, measured with aneroid and arranged in descending order, starts at the Chapman School, one mile eastward from Donald, and extends eastward to Little Laurel Creek of Gauley, 0.8 mile above its mouth and 0.5 mile east of the schoolhouse. Owing to the rise of the rocks the recorded intervals are less than true vertical measurement would show, there being a total rise of about 50 feet along the line of traverse:

Chapman School Section, Kentucky District.

	Thickness.	Total.	
	Feet.	Feet.	
Pottsville Series—Kanawha Group (155')			
Sandstone, massive, Dotson	35	35	
Concealed and shale.....	25	60	
Spring, Douglas Coal horizon.....	...	60	60'
Concealed	20	80	
Sandstone, Lower Dotson	10	90	
Concealed	25	115	
Coal streak , reported, Lower Douglas (2350' B.) ...	...	115	55'
Concealed	40	155	40'
Pottsville Series—New River Group (298')			
Sandstone, massive, Upper Nuttall , partly concealed	110	265	
Concealed	55	320	
Slate, black.....	15	335	
Concealed to Little Laurel Creek (2012' L.) ..	118	453	

The following section, measured with aneroid and arranged in descending order, starts at the top of the plateau, one-third mile east of Nettie, and extends northeastward with the public highway to Panther Creek at Lowland. Owing to the rise of the rocks the recorded intervals are less than true vertical measurement would show, there being a total rise of about 50 feet along the line of traverse:

Lowland Section, Kentucky District.

	Thickness.	Total.	
	Feet.	Feet.	
Pottsville Series—Kanawha Group (160')			
Sandstone, massive, pebbly, cliff rock, Lower Gilbert	40	40	
Shale, dark.....	39½	79½	
Coal , slaty (0' 6"), Gilbert (2660' B.)	0½	80	80'
Shale, dark-gray.....	35	115	
Shale, black, Douglas Coal horizon (2625' B.) ...	...	115	35'
Shale and concealed.....	45	160	

	Thickness.		Total.	
	Feet.	Feet.		
Pottsville Series—New River Group (390')				
Sandstone, partly concealed, Upper Nuttall ...	75		235	
Spring			235	
Concealed	25		260	
Sandstone, massive, Lower Nuttall (2400' B.) ..	80		340	225'
Concealed	110		450	
Coal blossom, Castle (2290' B.)			450	110'
Shale and concealed to coal test boring (28) (2190' L.).....	100		550	

In the following section, arranged in descending order, the surface portion was measured with aneroid, starting at the top of a high knob, 1.2 miles southward from Persinger Ford, and extends northward mainly with the public highway to Gauley River just above the ford, and thence is continued with the record of the **J. B. Jones No. 1 (36) Coal Test Record**. This boring was made by the Laing Mining Company, the record having been furnished the Survey by C. E. Krebs, Mining Engineer and Geologist, of Charleston, West Virginia. In the surface portion the recorded intervals are greater than true vertical measurement would show, as there is a dip in the strata amounting to 50 to 75 feet along the line of traverse:

Persinger Ford Section (South), Kentucky District.

	Thickness.		Total.	
	Ft.	In.		
Pottsville Series—Kanawha Group (600')				
Sandstone and concealed from top of knob.....	55	0	55 0	
Coal blossom, Campbell Creek (Peerless Bench) (2460' B.)			55 0	55'
Concealed in bench.....	20	0	75 0	
Sandstone	49	0	124 0	
Coal blossom, Campbell Creek (No. 2 Gas Bench) (2385' B.) thickness supplied	6	0	130 0	75'
Shale, sandy.....	85	0	215 0	
Concealed in bench, Eagle Coal horizon (2290' B.)	10	0	225 0	95'
Sandstone, massive, soft, Decota	80	0	305 0	
Shale, dark, sandy, Eagle	45	0	350 0	
Coal blossom, Lower War Eagle (2165' B.)			350 0	125'
Fire clay and shale.....	10	0	360 0	
Sandstone, massive, coarse, cliff, Lower Gilbert	75	0	435 0	
Concealed	125	0	560 0	

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Shale, dark, Douglas	20	0	580	0	
Sulphur spring, Lower Douglas Coal horizon (1935' B.).....	...	...	580	0	230'
Concealed	20	0	600	0	
Pottsville Series—New River Group (679' 3")					
Sandstone, massive, makes cliff, Upper Nuttall	80	0	680	0	
Concealed	50	0	730	0	
Sandstone, massive, pebbly, Lower Nuttall , to coal test boring.....	110	0	840	0	260'
Continued by J. B. Jones Coal Test (36) Record (1675' B.):					
Surface	12	4	852	4	
Sandstone	4	3	856	7	
No core.....	0	5	857	0	
Sandstone	9	9	866	9	
No core.....	0	3	867	0	
Sandstone	2	5	869	5	
Slate	4	6	873	11	
Soft slate.....	13	6	887	5	
No core.....	0	6	887	11	
Sand shale.....	15	4	903	3	
Slate	12	5	915	8	
Sand slate.....	26	2	941	10	
No core.....	2	11	944	9	
Sand slate.....	18	7	963	4	
Coal .....0' 10" } Castle	1	8	965	0	125'
Coal and slate .....0 10 }					
Sand slate.....	1	3	966	3	
Sandroek	10	5	976	8	
Sand slate.....	8	0	984	8	
Sandstone	1	10	986	6	
No core.....	0	9	987	3	
Sand slate.....	5	9	993	0	
Sandstone	2	2	995	2	
Sand slate.....	22	6	1017	8	
Slate	2	6	1020	2	
Coal, Sewell "B"	1	2	1021	4	56' 4"
Fire clay.....	0	5	1021	9	
Sand slate.....	11	4	1033	1	
No core.....	0	7	1033	8	
Coal, Sewell	2	5	1036	1	14' 9"
Fire clay.....	6	3	1042	4	
Sandstone, Welch	25	1	1067	5	
Sand slate.....	30	6	1097	11	
Coal, Welch	0	10	1098	9	62' 8"
Sand slate.....	3	0	1101	9	
Sandstone	7	3	1109	0	
Slate	4	0	1113	0	
No core.....	1	2	1114	2	
Slate	8	1	1122	3	
Sand slate.....	23	7	1145	10	
Sandstone, Upper Raleigh	12	8	1158	6	59' 9"
Sand slate.....	42	7	1201	1	

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Slate	10	6	1211	7	
Sand slate.....	24	9	1236	4	
Slate	10	8	1247	0	
Sand slate.....	13	9	1260	9	
Sandstone, Pineville?	18	6	1279	3	120' 9"
Total depth of hole, 439' 3".					

The following section, measured with aneroid and arranged in descending order, starts at the top of the plateau, 3 miles northeast of Mt. Nebo, and extends southwestward with the public highway to the level of a Coal Test Boring (37), located just east of the ford across Hominy Creek, and 1.8 miles northeast of the village named. Unfortunately the record of this boring was not obtained. The intervals recorded in the section are greater than true vertical measurement would show, there being a dip of approximately 75 feet along the line of traverse:

Hominy Ford Section, Kentucky District.

	Thickness.		Total.	
	Feet.		Feet.	
Pottsville Series—Kanawha Group (220')				
Sandstone, coarse, cliff rock, Lower Gilbert (top, 2180' B.).....	55		55	
Concealed and sandstone.....	155		210	
Bench, Lower Douglas Coal horizon (1960' B.)	10		220	220'
Pottsville Series—New River Group (300')				
Sandstone, Upper Nuttall	55		275	
Concealed and black slate.....	60		335	
Concealed	35		370	
Sandstone, massive, Lower Nuttall	100		470	
Concealed	10		480	
Shale, gray.....	5		485	
Coal, Hughes Ferry (1695' B.; Prospect No. 1095 on Map II) thickness concealed.....			485	265'
Concealed to coal test boring (37) (1660' B.).	35		520	

In the following section, arranged in descending order, the surface portion was measured with aneroid, starting at the top of the plateau, 0.7 mile northwest of Deepwell, and extending southeastward along the public highway to Deer Creek at Deepwell. The recorded intervals in this portion are less than true vertical measurement would show, as there is a total rise of 50 feet or more along the line of traverse. The lower portion is the record of the **Gauley Coal Land Company No. 1 (29) Oil Test Well**, drilled by the Wick Oil

and Gas Company, of Youngstown, Ohio, the record having been furnished the Survey by C. M. Boyd, Secretary, the location of the hole being at the foot of the measured section. Only a few slight shows of oil and gas were found:

Deepwell Section (Northwest), Kentucky District.

	Thickness. Feet.	Total. Feet.	
Pottsville Series—Kanawha Group (320')			
Sandstone, massive, pebbly, Lower Gilbert , from top of ridge	65	65	
Concealed and shale (2250' B.).....	60	125	
Sandstone, massive, Dotson , and concealed..	130	255	255'
Shale, dark, sandy, partly concealed.....	65	320	
Pottsville Series—New River Group (688')			
Sandstone, Upper Nuttall (lower portion)...	10	330	
Concealed in steep slope (2010' B.).....	90	420	
Sandstone, Lower Nuttall , and concealed....	60	480	
Sandstone, Harvey , to level of oil test well (29) (1807' L.).....	43	523	
Continued by Gauley Coal Land Company No. 1 (29) Oil Test Record (1807' L.):			
Sand and gravel (conductor, 26').....	26	549	
Slate	19	568	
Lime, white, hard	25	593	
Slate, black	35	628	
Coal , Sewell , steel-line measure.....	3	631	
Slate, black	21	652	
Coal	1	653	
Slate, white	20	673	
Sand, white, hard, Welch	35	708	
Slate, black	35	743	
Lime, white, hard	30	773	
Sand, gray, Rosedale Salt (Upper Raleigh) ..	33	806	
Slate, white	27	833	
Sand, white, Quinnimont	35	868	
Slate, shale, black	55	923	
Lime, hard, gray	20	943	
Slate, black	16	959	
Lime, gray, gritty	49	1008	
Pottsville Series—Pocahontas Group (220')			
Sand, hard, white, Flattop	40	1048	
Lime, hard, white (show of gas at 545')....	45	1093	
Shale, soft, black, Rift	20	1113	
Sand, soft, black.....13' 6" } Pierpont			
Slate, soft, white.....10 0 }			
Slate, hard, gray.....42 0 }			
Slate, soft, black, Royal?	8	1186	
Lime, hard, gray	42	1228	
Mauch Chunk Series (915')			
Red rock.....	20	1248	
Lime, hard, red	20	1268	
Red rock, soft	13	1281	
Lime, black, soft	12	1293	

	Thickness.	Total.
	Feet.	Feet.
Lime, white, hard	35	1328
Slate, white, soft	10	1338
Red rock, soft	10	1348
Lime, gray, hard, Terry?	35	1383
Slate, shells	40	1423
Red rock, soft.....	40	1463
Lime, gray	30	1493
Lime, red, soft	20	1513
Red rock, soft	20	1533
Lime, gray, hard	20	1553
Red rock, soft	40	1593
Lime, white, hard	18	1611
Red rock, soft	12	1623
Slate, black	15	1638
Lime, red, hard	105	1743
Red rock, soft	18	1761
Lime, gray	20	1781
Slate, black	15	1796
Sand, gray, very hard, Maxton	177	1973
Slate, white, soft	30	2003
Lime, hard...26' } Hinton?	35	2038
Lime, hard ... 9 }		
Sand, Webster Springs	15	2053
Slate	70	2123
Lime	15	2138
Cave (Pencil).....	5	2143
Greenbrier Series (340')		
Lime, white ...250' }		
Lime, pink 10 } Big Lime	340	2483
Lime, white ... 80 }		
Pocono Series (627')		
Red rock	30	2513
Sand, gray, Big Injun	50	2563
Slate	30	2593
Sand, gray, Squaw	30	2623
Lime	55	2678
Sand and lime, Weir	117	2795
Slate	315	3110
Catskill Series (773')		
Lime	18	3128
Slate and lime	465	3593
Sand, black, Bayard (Sixth)?	14	3607
Sand, gray (200 ft. salt water at 3100 ft.)		
Elizabeth (Seventh)?	276	3883
Chemung Series (481')		
Sand, light-gray (smell of oil). 15' }		
Sand, dark-gray (show of oil). 175 }		
Slate, black	10	
Sand, dark	10	
Slate	5	
Sand, gray	19	
Slate	7	
Sand, dark	5	
Slate	25	4154
Sand, dark	3	4157
Slate and shells.....	38	4195

	Thickness.	Total.
	Feet.	Feet.
Sand	6	4201
Slate shells	12	4213
Sand shells	8	4221
Sand, black .....10' } Warren Second?		
Slate and sand shells..20 } Burnside?	45	4266
Sand, dark .....15' }		
Sand, black	30	4296
Slate	5	4301
Sand, Clarendon?	52	4353
Lime	11	4364

Began spudding February 14, 1916; total depth of hole 3841'; abandoned as dry.

The following section, measured, with aneroid and arranged in descending order, starts at the top of the plateau, 1.2 miles southeast of Deepwell, and extends northwestward with the public highway to Deer Creek, just above the village. Owing to the rise of the rocks the recorded intervals are greater than true vertical measurement would show, there being a total rise of about 125 feet along the line of traverse:

Deepwell Section (Southeast), Kentucky District.

	Thickness.	Total.
	Feet.	Feet.
Pottsville Series—Kanawha Group (375')		
Concealed, with sandstone, from top of ridge	25	25
Sandstone, massive, Decota?	15	40
Slate, dark, Eagle	15	55
Coal blossom, Lower War Eagle (2520' B.)		55
Concealed and sandstone, pebbly, Lower Gilbert	120	175
Spring, Gilbert Coal horizon (2400' B.)		175
Concealed	200	375
Pottsville Series—New River Group (385')		
Sandstone, massive, cliff.45' } Upper Nuttall	140	515
Concealed and sandstone.95' }		
Concealed, with shale	60	575
Sandstone, massive, Lower Nuttall (1940' B.)	60	635
Concealed	30	665
Coal blossom, Hughes Ferry (1910' B.)		665
Concealed	50	715
Coal blossom, Lower laeger (1860' B.)		715
Concealed to creek	45	760

In the following section, arranged in descending order, the surface portion was measured with aneroid, starting at the top of Fury Knob, 1.4 miles southward from Deepwell, and extending northward, mainly with the public highway to the village named. In this portion the recorded intervals are

greater than true vertical measurement would show, the total rise of the rocks over the line of traverse amounting to about 150 feet. The lower portion of the section is the record of the **Gauley Coal Land Company (38) Coal Test**, previously published by the Survey¹², the same having been furnished by Mr. E. F. Saxman, of Haverford, Pennsylvania:

Fury Knob Section, Kentucky District.

	Thickness.		Total.	
	Ft.	In.	Ft.	In.
Pottsville Series—Kanawha Group (330')				
Sandstone, partly concealed, Decota	40	0	40	0
Concealed and shale, Eagle	34	6	74	6
Coal (0' 6") , Little Eagle (2530' B.)	0	6	75	0
Shale and concealed.....	45	0	120	0
Spring, Lower War Eagle Coal horizon (2485' B.).....	..	..	120	0
Concealed	5	0	125	0
Sandstone, partly concealed, Lower Gilbert	65	0	190	0
Fire clay shale, Gilbert Coal horizon (2415' B.).....	..	..	190	0
Concealed	15	0	205	0
Sandstone, partly concealed, Dotson	100	0	305	0
Concealed and black shale.....	25	0	330	0
Coal blossom, Lower Douglas (2275' B.).....	..	..	330	0
				140'
Pottsville Series—New River Group (918' 8")				
Concealed	160	0	490	0
Coal fragments, not in place? (2115' B.).....	..	..	490	0
Concealed	40	0	530	0
Coal fragments, not in place? (2075' B.).....	..	..	530	0
Concealed	100	0	630	0
Slate and coal blossom, Hughes Ferry (1970' B.)	5	0	635	0
Concealed to Coal Test boring (38) at Deepwell (1800' L.)	170	0	805	0
Continued by Gauley Coal Land Company (38) Coal Test Record (1800' L.):				
Surface and boulders.....	23	0	828	0
Soapstone and shale.....	21	9	849	9
Sandstone	4	6	854	3
Shale, light.....	1	8	855	11
Sandstone	3	4	859	3
Shale, light.....	17	0	876	3
Slate, black.....	2	9	879	0
Coal, Sewell "B"	0	9	879	9
Fire clay.....	2	0	881	9
Bastard fire clay.....	6	0	887	9
				244' 9"

¹²I. C. White, Vol. II(A), W. Va. Geol. Survey, pp. 222-223; 1908.

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Shale, light.....	3	11	891	8	
Sandstone ..0' 6" } Shale, dark..0 8 } Sandstone ..2 7 } Shale, dark..0 9 } Sandstone ..2 6 } Shale, dark..9 0 } Sandstone ..2 5 }	Lower Guyandot Sandstone		18	5	910 1
Shale, dark, Hartridge	1	8	911	9	
Slate	0	2	911	11	
Coal, Sewell	4	6	916	5	36' 8"
Bastard fire clay.....	2	10	919	3	
Shale, dark.....	29	2	948	5	
Slate, streaked with coal.....	0	8	949	1	
Shale, dark.....	3	8	952	9	
Shale, light.....	6	0	958	9	
Shale, light.....	3	0	961	9	
Sandstone, hard, Welch	12	2	973	11	
Shale, dark.....	13	6	987	5	
Coal, dirty, Welch	1	2	988	7	72' 2"
Bastard fire clay.....	2	2	990	9	
Sandstone	9	7	1000	4	
Shale, dark.....	140	7	1140	11	
Sandstone ...25' 8" } Conglomerate } sandstone... 3 7 }	Quinnimont..		29	3	1170 2
Bastard fire clay, Fire Creek Coal horizon	4	0	1174	2	185' 7"
Shale, dark.....	6	6	1180	8	
Bastard fire clay.....	8	0	1188	8	
Sandstone, Pineville	54	0	1242	8	
Shale, dark.....	1	6	1244	2	
Sandstone	2	6	1246	8	
Shale, dark.....	2	0	1248	8	
Pottsville Series—Pocahontas Group (196' 4")					
Sandstone ...14' 10" } Bastard clay .. 2 10 } Sandstone ....20 6 }	Flattop ...		38	2	1286 10
Light sand shale 1' 3" } Sandstone 1 0 } Light sand shale.16 10 } Sandstone 3 8 }	Rift		30	5	1317 3
Light sand shale 7 8 }					
Sandstone, Pierpont?	60	3	1377	6	
Sand shale, Royal?	26	6	1404	0	
Sandstone, Eckman?	30	4	1434	4	
Shale, dark, to bottom	10	8	1445	0	

The following section, measured with aneroid and arranged in descending order, starts at the top of the plateau, 1.3 miles eastward from Orndorff Bridge, and 2.2 miles northwest of Hominy Mill and extends westward along the public highway to the point where the bridge spans Hominy Creek.

Owing to the rise of the rocks the recorded intervals are greater than true vertical measurement would show, the total rise of the rocks along the line of traverse being 75 to 100 feet:

Orndorff Bridge Section, Kentucky District.

	Thickness. Total.	
	Feet.	Feet.
Pottsville Series—Kanawha Group (35')		
Shale, sandy, from top of knob	35	35
Pottsville Series—New River Group (815')		
Sandstone, massive, coarse, lower portion makes cliff, Upper Nuttall (top, 2640' B.)...	105	140
Shale and concealed	25	165
Coal blossom, laeger "B" (2515' B.).....	..	165
Concealed and sandy shale	60	225
Sandstone, coarse, Lower Nuttall (2410' B.)..	45	270
Concealed	25	295
Sandstone, Middle laeger	25	320
Shale, dark	35	355
Shale, sandy	70	425
Sandstone, massive, coarse, makes cliff, Harvey	70	495
Shale and concealed	35	530
Slate, black, Castle Coal horizon (2150' B.)... ..	..	530
Concealed and sandstone	85	615
Coal blossom, Sewell? (2065' B.).....	..	615
Concealed, with sandstone and shale.....	160	775
Slate, dark, Fire Creek Coal horizon? (1905' B.)	5	780
Concealed	30	810
Sandstone, massive, Pineville , to Hominy Creek (1835' B.).....	40	850

The following section, measured with aneroid and arranged in descending order, starts at the top of White Buck Knob, 2.5 miles southeast of Leivasy, and extends southward, mainly along the public highway to Brushy Meadow Creek, the upper 150 feet not having been examined in detail. Owing to the pitch of the strata the recorded intervals are less than true vertical measurement would show, the total rise along the line of traverse amounting to about 125 feet:

White Buck Knob Section, Kentucky District.

	Thickness. Total.	
	Feet.	Feet.
Pottsville Series—New River Group (615')		
Interval from top of White Buck Knob.....	150	150
Concealed from low gap at road summit.....	50	200
Coal blossom, Lower laeger (3000' B.).....	..	200
Shale, sandy	20	220
Concealed	60	280

	Thickness. Feet.	Total. Feet.	
Sandstone, massive, Guyandot	35	315	
Concealed	82	397	
Coal, Sewell (2800' B.) reported.....	3	400	200'
Concealed	30	430	
Sandstone, massive, Upper Raleigh	50	480	80'
Shale, sandy	80	560	
Sandstone, massive, Pineville , to Brushy Meadow Creek (2585' B.).....	55	615	135'

The following section, measured with aneroid and arranged in descending order, starts at the top of Coggins Knob, 1.5 miles southward from Hominy Falls, and extends southwestward along the strike of the rocks and mainly with the public highway to Hominy Creek, 0.7 mile below Bamboo, the thickness of the Sewell Coal being supplied from a near-by opening:

Coggins Knob Section, Kentucky District.

	Thickness. Feet.	Total. Feet.	
Pottsville Series—Kanawha Group (60')			
Sandstone, massive, Lower Dotson , capping knob	30	30	
Concealed	30	60	
Slate, black, Lower Douglas Coal horizon (2900' B.) .....	...	60	60'
Pottsville Series—New River Group (510')			
Sandstone, massive, Upper Nuttall , mostly concealed in bluff.....	75	135	
Concealed	65	200	
Sandstone, visible, Lower Nuttall	25	225	
Coal blossom, Hughes Ferry (2735' B.).....	...	225	165'
Concealed, with shale.....	80	305	
Coal blossom, Lower laeger (2655' B.).....	...	305	80'
Fire clay shale	5	310	
Sandstone, massive, Harvey	40	350	
Concealed	4	354	
Coal (1' 0" visible), Castle (2605' B.).....	1	355	50'
Fire clay and sandy shale	10	365	
Concealed, with sandstone, Guyandot and Lower Guyandot	93	458	
Shale, dark, Hartridge	10	468	
Coal blossom, heavy, Sewell (2485' B.) thick- ness supplied	7	475	120'
Shale and concealed.....	10	485	
Sandstone, shaly, Welch	15	500	
Shale, sandy	25	525	
Slate, black, Welch Coal horizon (2435' B.)... ..	...	525	50'
Concealed	30	555	
Sandstone, Upper Raleigh , to Hominy Creek	15	570	

MEASURED SECTIONS, WILDERNESS DISTRICT.

Wilderness District occupies the southwestern corner of the county, being west of Kentucky District and south of Gauley River, and having Fayette and Greenbrier Counties along its western and southern sides, respectively. Its surface rocks range from the lower portion of the Kanawha Group, which caps the highest ridges in many localities, down almost to the basal portion of the New River Group of the Pottsville.

The following section, measured with aneroid and arranged in descending order, starts at the summit of the plateau within the Rucker Bend, 1.5 miles northwest of Mt. Nebo, and extends northeastward along the strike of the rocks to Gauley River, just below Long Point:

Rucker Bend Section, Wilderness District.

	Thickness.		Total.
	Feet.	Feet.	Feet.
Pottsville Series—Kanawha Group (5')			
Concealed and shale	4	4	
Coal, (reported 0' 10") Lower Douglas			
(1810' B.; Prospect No. 1057 on Map II)...	1	5	5'
Pottsville Series—New River Group (365')			
Sandstone, massive, great cliff, Upper Nuttall	90	95	
Concealed	36	131	
Sandstone, great pebbly cliff, Lower Nuttall	105	236	
Slate	5	241	
Coal 1' 2" } (4' 0") Hughes Ferry			
Concealed .. 2 0 } (1570' B.) Prospect No.	4	245	240'
Coal, reported 0 10 } 1102 on Map II.			
Sandstone, Middle laeger	10	255	
Concealed	70	325	
Shale, dark	3	328	
Coal, Castle (1485' B.; Prospect No. 1133 on			
Map II); reported	2	330	85
Fire clay and sandy shale	25	355	
Concealed and sandy shale to Gauley River..	15	370	

In the following section, arranged in descending order the surface portion was measured with aneroid, starting at the top of the plateau just east of Snow Hill School, and extends northeastward with the strike of the rocks along the public highway to an opening in the Sewell Coal at the foot of the mountain, one-third mile west of Hominy Creek. The lower portion is the record of the **Gauley Coal Land Com-**

pany (Granville O'Dell) No. 1 (31) Oil Test Well, located just west of Hominy Creek, and 1.4 miles southward from Hominy Falls, and being 0.4 mile northeast of the foot of the measured section. Inasmuch as the Sewell Coal is opened within a few feet of the well and only 7 feet above the level of the top of the hole, no difficulty was experienced in making connection with the stratigraphic measurement described above. The well was drilled by the Wick-Laing Oil and Gas Company, its record having been furnished by Mr. C. M. Boyd, Secretary, of Youngstown, Ohio. It was abandoned as a dry hole, only a small amount of gas having been found in the Princeton Sandstone:

Hominy Falls Section, Wilderness District.

	Thickness.		Total.
	Feet.	Feet.	
Pottsville Series—New River Group (1057')			
Sandstone, massive, from road fork, Upper Nuttall	75	75	
Shale, black	10	85	
Fire clay, streak, (laeger "B" Coal horizon) (2870' B.) .....	...	85	
Sandstone, massive, coarse, soft, Lower Nuttall	115	200	
Concealed	40	240	
Spring, Hughes Ferry Coal horizon (2710' B.) ...	...	240	240'
Slate, black	15	255	
Concealed and shale	25	280	
Sandstone, Harvey	40	320	
Concealed	60	380	
Sandstone, massive, Guyandot , and concealed in steep bank	143	523	
Shale, dark, Hartridge	2	525	
Coal, soft 2' 4" } (5' 1") Sewell			
Slate, bony 0 7 } (2420' L.) Mine No.	5	530	290'
Coal, bony 1 6 } 1235 on Map II.			
Coal, soft, good. 0 8 }			
Sandstone and concealed to stratigraphic level of Well (31)	7	537	
Continued by Gauley Coal Land Company (Granville O'Dell) No. 1 (31) Well Record:			
Conductor	16	553	
Slate shell (hole full of water at 20')	64	617	
Coal blossom, Welch?	2	619	
Slate, black	148	767	
Sand, gray, Lower Raleigh	20	787	
Lime, white	30	817	
Coal, Beckley?	5	822	
Slate, shell, dark (hole full of water at 304')	68	890	
Coal, Fire Creek?	5	895	
Slate, dark	7	902	

	Thickness. Feet.	Total. Feet.
Lime, gritty (hole full of water at 385').....	55	957
Slate, dark	15	972
Lime, dark, hard.....	65	1037
Sand, gray, hard, Pineville, (hole full of water at 510').....	20	1057
Mauch Chunk Series (1418')		
Red rock	120	1177
Sand, gray, hard, Princeton (gas at 694', steel- line measure)	140	1317
Slate and shells, dark	175	1492
Red rock and lime shells	75	1567
Red rock lime shells	125	1692
Lime shells	25	1717
Lime shells, red rock	75	1792
Lime, gritty, Terry?.....	40	1832
Sand, very hard	45	1877
Slate, soft	15	1892
Lime, very hard	20	1912
Slate, soft'	6	1918
Lime, very hard	12	1930
Slate, soft	10	1940
Lime, broken up	15	1955
Slate, white	10	1965
Slate	30	1995
Lime, hard	13	2008
Slate	10	2018
Sand, Maxton	39	2057
Slate, soft	12	2069
Slate and lime, broken up	118	2187
Lime, white ...102' } Slate, white... 15 } Hinton (Little Lime). 215 Lime 98 }		2402
Sand, Webster Springs	35	2437
Slate, black	5	2442
Sand	13	2455
Pencil Cave	20	2475
Greenbrier Series (393')		
Big Lime	393	2868
Pocono Series (311')		
Sand, Keener	12	2880
Red rock	3	2883
Sand, Big Injun	16	2899
Slate	49	2948
Squaw Sand.....	19	2967
Sand shells ..	110	3077
Sand, Berea	102	3179
Catskill and Chemung Series (1111')		
Lime shells, slate	363	3542
Lime	20	3562
Shells and slate	85	3647
Lime	60	3707
Slate and shells	150	3857
Lime, gritty	125	3982
Lime, gritty, and shells (steel-line measure). 308		4290

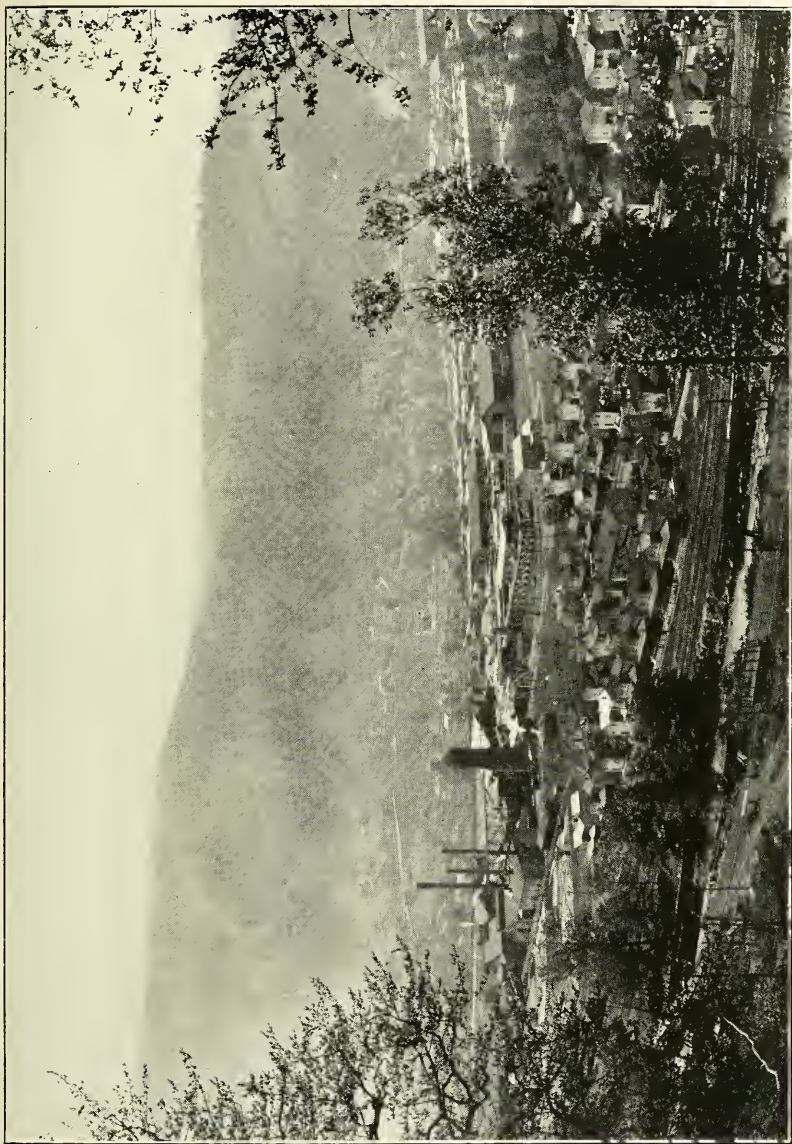


PLATE VII.—View of eastern portion of Richwood; Topography mainly of New River Group, with Mauch Chunk Series at base; North Fork of Cherry River in foreground; large wood-working plants occupy central portion of town and picture.

Photo by R. T. Colebank, Sutton, W. Va.

Began spudding, October 26, 1915; shut down May 11, 1916, 6 P. M. 10" casing, 345'; 8¼" casing, 975'; 6¾" casing, 1658'. Total depth of hole, 3753'.

The following section, measured with aneroid and arranged in descending order, starts at the summit of the ridge, 0.6 mile southwest of Bamboo, and extends northeastward with the public highway to Hominy Creek, 0.4 mile below the village named. Owing to the dip of the rocks the recorded intervals are greater than true vertical measurement would show, the total dip along the line of traverse being 30 to 40 feet:

Bamboo Section, Wilderness District.

Pottsville Series—New River Group (425')	Thickness. Total.		
	Feet.	Feet.	
Concealed from top	15	15	
Sandstone, massive, Lower Nuttall (2765' B.)	35	50	50'
Concealed	90	140	
Sandstone, massive, Harvey.....	25¼	165	
Concealed	25	190	
Spring, Castle Coal horizon? (2625' B.).....	...	190	140'
Concealed	100	290	
Sandstone, massive, Lower Guyandot.....	50	340	150'
Concealed to Hominy Creek (2390' B.).....	85	425	

The following section, measured with aneroid and arranged in descending order, starts at the top of the plateau, 0.4 mile south of Mt. Lookout, and extends westward, mainly with the public highway, to the level of the **Nuttall Heirs Coal Test (53)**, located on the west side of Meadow River at the mouth of Brackens Creek and one-fourth mile below Shawver Bridge. No record of this boring, which is in Nuttall District, Fayette County, has been obtained. Owing to the dip of the strata the recorded intervals are greater than true vertical measurement would show, the total dip along the line of traverse being about 100 feet:

Mt. Lookout Section, Wilderness District.

Pottsville Series—Kanawha Group (25')	Thickness. Total	
	Feet.	Feet.
Concealed and shale	18	18

	Thickness. Feet.	Total Feet.	
Coal, Lower Douglas (reported 1' 8"; 1980' B.; Prospect No. 1067 on Map II).....	2	20	20'
Shale, sandy	5	25	
Pottsville Series—New River Group (375')			
Sandstone, massive, Upper Nuttall	105	130	
Concealed	20	150	
Sandstone, great pebbly cliff, Lower Nuttall	115	265	
Shale, dark, and concealed	30	295	
Coal, Hughes Ferry (1705' B.; Prospect No. 1104 on Map II), thickness concealed.....	...	295	275'
Sandstone, Middle laeger	10	305	
Shale, dark	35	340	
Sandstone, Harvey	10	350	
Concealed	3	353	
Coal, soft, Castle , (1' 9"; 1645' B.; Prospect No. 1134 on Map II).....	2	355	60'
Sandstone, massive, Guyandot	35	390	
Concealed to bore hole (53) (1600' B.).....	10	400	

The following section, measured with aneroid and arranged in descending order, starts at the top of the ridge, 2.3 miles southwest of Snow Hill, and extends eastward with the the public highway to the level of the **Gauley Coal Land Company Coal Test (52)**, located on Anglins Creek, 1.2 miles above the mouth of Elevenmile Fork. No record of this hole was obtained:

Anglins Creek Section, Wilderness District.

	Thickness. Feet.	Total Feet.	
Pottsville Series—New River Group (615')			
Sandstone, Upper Nuttall	25	25	
Concealed and sandy shale	105	130	
Coal blossom, heavy, Hughes Ferry (2575' B.) ...	...	130	130'
Sandstone, massive, cliff rock, with shaly streaks, laeger and Harvey	155	285	
Shale, dark, partly concealed	35	320	
Sandstone, massive, Guyandot	10	330	
Shale, dark, partly concealed	30	360	
Concealed	30	390	
Slate, dark, Hartridge	3	393	
Coal, soft, Sewell (2' 1"; 2310' B.; Mine No. 1240 on Map II)	2	395	265'
Sandstone, massive, Welch	35	430	
Concealed	130	560	
Shale, dark	5	565	
Concealed to Coal Test (52) (2090' B.).....	50	615	

The following section, measured with aneroid and arranged in descending order, starts at the top of the ridge, 0.8

mile northeast of Nallen, and extends southwestward with the public highway to Meadow River, at the town named, being mostly on the strike of the rocks and therefore representing approximately true vertical measurement:

Nallen Section, Wilderness District.

Pottsville Series—New River Group (420')	Thickness. Total.		
	Feet.	Feet.	
Sandstone, massive, partly concealed, Lower Nuttall	85	85	
Concealed	20	105	
Coal blossom, Hughes Ferry (2200' B.) , streak ...		105	105'
Shale, sandy, and concealed.....	20	125	
Sandstone, Middle laeger	5	130	
Concealed	10	140	
Fire clay and dark shale, Lower laeger Coal horizon (2160' B.)	5	145	40'
Shale, sandy	10	155	
Concealed	69	224	
Coal blossom, Castle (2080' B.)	1	225	80'
Sandstone, massive	10	235	
Concealed	70	305	
Shale, sandy	5	310	
Sandstone, massive, Guyandot	25	335	
Concealed	15	350	
Shale, dark, Sewell "B" Coal horizon (1950' B.)	5	355	130'
Concealed	10	365	
Sandstone, massive, Lower Guyandot	5	370	
Shale, dark	3½	373½	
Coal blossom, Sewell, upper bench (1930' B.) reported	1½	375	
Concealed	20	395	
Shale, dark	8	403	
Coal, soft, Sewell, lower bench, (2' 2"; 1900' B.; Exposure No. 1245 on Map II)	2	405	50'
Shale, dark, concealed, and shale	10	415	
Sandstone, massive, to Meadow River	5	420	

The following section, prepared by Ray V. Hennen¹³, and arranged in descending order, starts at the top of a hill, one-half mile west of Russellville, Nuttall District, Fayette County, and extends eastward, with aneroid measurement, to Meadow River just below the village and there connects with the record of the **Mrs. E. T. Martin Coal Test (56)**, located in Meadow Bluff District, Greenbrier County, just opposite the town, and is continued with the same, as furnished the Survey

¹³Ray V. Hennen, Fayette Report, W. Va. Geol. Survey, pp. 176-177; 1919.

by Mr. Samuel Stephenson, of Charleston, West Virginia. Inasmuch as this section is only two miles south of the southwestern corner of Nicholas County it furnishes valuable information concerning the subsurface strata in that region:

Russellville Section, Nuttall District, Fayette County.

New River Group (676' 3")	Thickness.		Total. Ft. In.
	Ft.	In.	
Concealed in gentle slope with small, hard, grayish-white boulders, from summit of hill.....	65	0	65 0
Concealed in bench	10	0	75 0
Sandstone, grayish-white	20	0	95 0
Concealed in bench	15	0	110 0
Sandstone, current-bedded, grayish-white, Guyandot	30	0	140 0
Concealed, mostly sandstone	25	0	165 0
Shale, buff, sandy	20	0	185 0
Coal, Sewell "B", and concealed...	10	0	195 0
Concealed	5	0	200 0
Sandstone, current-bedded, Lower Guyandot	25	0	225 0
Concealed	3	6	228 6
Coal, Sewell. (2045' B.)	1	6	230 0
Concealed, steep slope, mostly sandstone	45	0	275 0
Concealed, gentle slope	25	0	300 0
Concealed, steep slope	15	0	315 0
Sandstone, grayish-white, making cliff, Upper Raleigh	45	0	360 0
Concealed to top of coal boring...	5	0	365 0
(Continued with log of Mrs. E. T. Martin Boring No. 56 on Map 11) (Elevation top of hole—1930' B.):			
Surface	10	0	375 0
Sandstone, Upper Raleigh	10	0	385 0
Slate, gray	57	0	442 0
Bone, Little Raleigh Coal	0	4	442 4
Sandstone, hard, Lower Raleigh ...	26	0	468 4
Slate, gray	65	3	533 7
Shale, dark, sandy	17	10	551 5
Slate, gray	27	5	578 10
Sandstone and shale	4	7	583 5
Sandstone, Quinnimont	40	7	624 0
Sandstone, pebbly	2	0	626 0
Sandstone, horizon of Fire Creek			
Coal	2	0	628 0
Bastard fire clay	3	6	631 6
Sand shale	10	8	642 2
Slate, gray	12	5	654 7
Slate, black	1	2	655 9
Coal, dirty, Little Fire Creek	1	8	657 5
Bastard fire clay	1	5	658 10

	Thickness.		Total.			
	Ft.	In.	Ft.	In.		
Sandstone, Pineville	11	2	670	0		
Coal, No. 9 Pocahontas (No. 6 Pocahontas?)	1	2	671	2		
Bastard fire clay	2	0	673	2		
Sandstone	3	1	676	3	18'	10"
Pocahontas Group (56' 9")						
Shale, dark, sandy. 6' 6" } Flattop						
Slate, gray 6 7 } Mountain	17	1	693	4		
Sandstone 4 0 } Sandstone						
Shale, dark, sandy, Rift, to horizon of No. 7 Pocahontas Coal.....	5	9	699	1		
Bastard fire clay	1	10	700	11		
Shale, sandy	15	4	716	3		
Sandstone, Pierpont	9	4	725	7		
Slate, black, Royal Shale	1	1	726	8		
Coal, No. 6 Pocahontas (No. 3 Pocahontas?)	2	5	729	1	52'	10"
Bastard fire clay	2	0	731	1		
Sandstone to bottom of hole	1	11	733	0	3'	11"

SUMMARY OF MEASURED SECTIONS.

For convenient reference the thickness of the stratified rocks of Nicholas, as determined by the measured sections in this Chapter, is compiled in the following table, showing not only the thickness of the various series and groups, but also the totals for the Pennsylvanian, Mississippian, and Devonian Rocks, down to the lowest depths to which the drillings have penetrated them in the county. A line of dots under a series indicates that it was not exposed where the section was made. A question mark indicates that the series was present but could not be differentiated from the one overlying or underlying it. In some cases a section shows a thickness of a series either too great or too small, owing to the dip of the measures where it was made, as many sections having been made on the strike as was possible. In many cases the sections show only part of a series, the remainder not being exposed. An explanation accompanies each section, where published in full in the preceding text, detailing the conditions under which it was made:

Table showing Thickness of Stratified Rocks in Nicholas County.

Place Measured	Pennsylvanian					Mississippian				Devonian		Total Section	
	Conemaugh	Allegheny	Pottsville			Mauch Chunk	Greenbrier Limestone	Pocono Sandstone	Total	Catskill	Chemung		Total
			Kanawha	New River	Poconontas									Total
Anglins Creek.....					615				615			615	
Anthony Creek (Mouth).....									815			815	
Bamboo.....	80	300	633						633			1013	
Beaver.....			205		425				425			425	
Beech Fork of Lilly Fork.....			205						205			205	
Belva.....		285	838.7		254.3				1093			1378	
Bentree.....		188	1216		(?)				2066			2775	
Big Spruce Knob.....			477						477	161		709	
Branch River					40				40	546		3082	
Burl.....		275	430						430			730	
Camden-on-Gauley.....		225	415		55				470			470	
Carnifex Ferry.....			966		634				1600			1825	
Chapman School.....			20		510				530			530	
Coggins Knob.....			155		298				453			453	
Cranberry (South-east).....			60		510				570			570	
Cranberry (West).....			175		660				835			835	
Dade.....		110	330		245				575			575	
Deepwell (North-west).....			(?)		(?)				1700			590	
Deepwell (South-east).....			326		688				1228	340		1882	
Dille.....		340	375		385				760			760	
Dogway.....	60		(?)		(?)				1885			2249	
Fenwick.....		70	300		580				880	85		880	
Fockier Branch of Muddyety.....			785						785			785	
Fury Knob.....		245	330		918.7				475			720	
			330						1445			1445	

Table showing Thickness of Stratified Rocks in Nicholas County.—(Continued).

Place Measured	Pennsylvanian				Mississippian				Devonian		Total Section	
	Conemaugh	Allegheny	Pottsville		Mauch Chunk	Greenbrier Limestone	Pocomo Sandstone	Total	Catskill	Chemung		Total
			Kanawha	New River									Poehontas	Total
Gilboa	195.5	1000	298.8	.....	.....	.....	1298.8	.....	.....	.....	1298.8
Greendale	684.4	.....	.....	.....	.....	879.5	.....	.....	.....	879.9
Hardway Branch of Twentymile	210	765	.....	.....	.....	.....	975	.....	.....	.....	975
Harriet (North)	255	450	.....	.....	.....	.....	705	.....	.....	.....	705
Harriet (South)	160	630	.....	.....	.....	.....	790	.....	.....	.....	790
Herold (North-east)	290	270	55	.....	.....	.....	.....	615	.....	.....	.....	615
Herold (South)	224.2	50	.....	.....	.....	.....	274.2	.....	.....	.....	274.2
Hominy Falls	1057	.....	.....	.....	.....	1418	.....	.....	.....	4290
Hominy Ford	220	300	.....	.....	.....	520	.....	.....	.....	520
Hookersville	347	788	490	.....	.....	.....	1640	.....	.....	.....	3165
Ison Branch of Robinson Fork	260	360	.....	.....	.....	.....	620	.....	.....	.....	620
Lockwood	735	.....	.....	.....	.....	735	.....	.....	.....	735
Long Point of Gauley	60	380	.....	.....	.....	440	.....	.....	.....	440
Lowland	160	390	.....	.....	.....	550	.....	.....	.....	550
Mt. Lookout	25	375	.....	.....	.....	400	.....	.....	.....	400
Muddley	180	.....	.....	.....	.....	475	.....	.....	.....	475
Muddley Creek	138	72	.....	.....	.....	210	.....	.....	.....	210
Muddick Run of Anthony	(?)	(?)	597	.....	.....	.....	.....	960	.....	.....	.....	960
Nallen	420	.....	.....	.....	420	.....	.....	.....	420
Orndorff Bridge	35	815	.....	.....	.....	850	.....	.....	.....	850
Panther Mountain	980	445	.....	.....	.....	1425	.....	.....	.....	1425
Payne Branch of Sycamore Creek	174	.....	.....	.....	.....	599	.....	.....	.....	599
Persinger Ford (North)	210	240	.....	.....	.....	450	.....	.....	.....	450
Persinger Ford (South)	600	679.2	.....	.....	.....	1279.2	.....	.....	.....	1279.2

Table showing Thickness of Stratified Rocks in Nicholas County.—(Concluded).

Place Measured	Pennsylvanian					Mississippian				Devonian			Total Section	
	Conemaugh	Allegheny	Pottsville			Total	Mauch Chunk	Greenbrier Limestone	Pocoho Sandstone	Total	Catskill	Chemung		Total
			Kanawha	New River	Poahontas									
Rich Fork of Anthony	1194	5319	.....	.....	.....	.....	.....	1334.7	
Richwood	125	833.8	360.2	.....	760	760	.....	.....	.....	.....	.....	900	
Rucker Bend	5	760	.....	370	370	.....	.....	.....	.....	.....	370	
Russellville	676.2	365	56.8	733	733	.....	.....	.....	.....	.....	733	
Shant Branch	855	465	.....	.....	820	820	.....	.....	.....	.....	.....	820	
Skyles	262	575	.....	.....	890	890	.....	.....	.....	.....	.....	890	
Summersville	53	.....	670	.....	.....	725	725	.....	.....	.....	.....	.....	725
Swiss	55	965	.....	.....	965	965	.....	.....	.....	.....	.....	965	
Tipton	425	20	.....	445	445	.....	.....	.....	.....	.....	445	
Wade	420	420	.....	.....	.....	.....	.....	420	
White Buck Knob	300	.....	.....	615	.....	615	615	.....	.....	.....	.....	.....	615

CHAPTER V.

STRATIGRAPHY---CONEMAUGH AND ALLEGHENY SERIES.

GENERAL ACCOUNT AND SECTION, CONEMAUGH SERIES.

The Conemaugh Series of the Pennsylvanian Rocks, first named in 1878 by Franklin Platt, from its outcrop along the Conemaugh River in Pennsylvania, comprises only a small portion of the surface rocks of Nicholas. As shown on Map II its areal limit is confined to a strip along the northwestern border where the series caps some of the high ridges, a total thickness of about 300 feet being recorded in a few localities. The lower half of the series, as visible in Nicholas, consists of heavy gray or brown sandstone beds, sometimes pebbly, with red, gray, or brown shale deposits intervening, sometimes accompanied by thin streaks of coal or fire clay. The red beds mainly occur above the Buffalo Sandstone, being seldom found below this arenaceous stratum. Lithologically that portion of the series found in Nicholas contains approximately 69 per cent. of sandstone, 30 per cent. of shale, and 1 per cent. of coal.

The following General Section illustrates the thickness, character, and position of the various members of the series belonging in that portion found in Nicholas, some of the individual members not having been observed:

General Section of the Conemaugh Series for Nicholas County.

	Thickness.	Total.
	Feet.	Feet.
Eroded portion, composed of sandstones, red shales, and thin coals, occurring in Braxton, Clay, and other counties but not found in Nicholas; approximate thickness	350 to 385	385

	Thickness.	Total.	
	Feet.	Feet.	
Sandstone, Saltsburg, massive, gray or brown, sometimes replaced by red shale	20 to 35	420	
Coal, Bakerstown, normally 1 to 4 feet thick, not observed .....	..	420	420'
Fire clay shale, reds, and sandy shale, horizon of Pine Creek Limestone...	20 to 30	450	
Sandstone, Buffalo, massive, gray, sometimes replaced by red, sandy shale..	50 to 60	510	
Limestone and shale, Brush Creek, gray or black, with plant and marine fossils..	0 to 9	519	
Coal, Brush Creek, thin and slaty.....	0 to 1	520	100'
Fire clay shale	0 to 10	530	
Sandstone, Upper Mahoning, massive, coarse, pebbly, grayish-brown	30 to 40	570	
Limestone, Sutton, yellowish-gray, lenticular, not observed in county .....	..	570	
Shale, gray, sometimes carrying the lenticular Middle Mahoning Sandstone.....	0 to 10	580	
Coal, Mahoning, not observed .....	..	580	60'
Fire clay shale, Thornton	0 to 5	585	
Sandstone, Lower Mahoning, massive, coarse, pebbly, grayish-brown, sometimes forms cliffs	25 to 40	625	
Shale, Uffington, dark-gray, sandy, with plant fossils	0 to 10	635	55'
Coal, Upper Freeport (top of Allegheny Series) .....	..	..	..

DESCRIPTION OF MEMBERS, CONEMAUGH SERIES.

SALTSBURG SANDSTONE.

The Saltsburg Sandstone of John J. Stevenson, named from its occurrence at Saltsburg, Pennsylvania, and belonging just above the Bakerstown Coal, is the highest member of the Conemaugh Series noted in Nicholas. In the counties of northern West Virginia where it is found in abundance, it is usually massive, and brown or gray in color, frequently carrying quartz pebbles. In Nicholas it was noted in Hamilton District in a high knob, 0.8 mile southeast of Wade, where, as recorded in the section for that village, page 137, it is brown in color, being partly concealed so that its thickness could not be definitely determined. In certain other counties it bears a fine reputation as a building stone, but it does not seem probable that any deposits of sufficient quantity to justify its exploitation occur in Nicholas.

BAKERSTOWN COAL.

The **Bakerstown Coal** of White¹, belonging just below the Saltsburg Sandstone, and about 420 feet below the top of the Conemaugh Series, was not observed in Nicholas at the few points where its horizon occurs, and it must therefore be disregarded as an economic asset of the county.

The **Pine Creek Limestone** of White², named for its occurrence in the State of Pennsylvania, and belonging in the shale interval separating the Bakerstown Coal from the Buffalo Sandstone, was not noted in Nicholas, and its presence has been described at only a few localities in adjoining counties where its horizon is found.

BUFFALO SANDSTONE.

The **Buffalo Sandstone** of White³, named from its occurrence in western Pennsylvania, and widely prevalent in many of the northern counties of West Virginia where it is a coarse, gray sandstone, with frequent pebbles, was not observed in Nicholas. In the section for Wade, page 137, its horizon is occupied by sandy or red shale. It seems quite likely, however, that a search of the ridges of northwestern Nicholas might reveal it at a few points. Its base should come about 510 feet below the top of the Conemaugh Series and about 125 feet above the Upper Freeport Coal.

BRUSH CREEK LIMESTONE AND SHALE.

The **Brush Creek Limestone** of White⁴, and the **Brush Creek Shale** of Hennen⁵, occupying the 5 to 10 feet of interval between the Buffalo Sandstone and Brush Creek Coal, were not observed in Nicholas but probably would be revealed by patient search as they are known to be present in the adjoining counties of Braxton and Clay. This stage of the Conemaugh consists of a dark, argillaceous shale, interstratified with a dark, siliceous limestone, a few inches thick, both of

¹I. C. White, Report Q, Sec. Geol. Survey of Penna.

²I. C. White, Report Q, Sec. Geol. Survey of Penna.

³I. C. White, Report Q, Sec. Geol. Survey of Penna.

⁴I. C. White, Report Q, Sec. Geol. Survey of Penna.

⁵Ray V. Hennen, Monongalia, Marion and Taylor Report, W. Va. Geol. Survey, p. 310; 1913.

which frequently contain marine fossils in abundance. The shale was observed in Buffalo District, Clay County, 0.4 mile southeast of Wattsville, containing fossil shell fragments, its elevation being 1650' B. In the section for Wade, page 137, its horizon is occupied by sandy shale, no fossils having been found.

BRUSH CREEK COAL.

The **Brush Creek Coal** of White⁶, named from its occurrence in western Pennsylvania, and belonging just below the Brush Creek Limestone and Shale, appears to be only poorly represented in Nicholas. In the section for Wade, page 137, its horizon is occupied by a streak of fire clay, but elsewhere it was not noted.

UPPER MAHONING SANDSTONE.

The **Upper Mahoning Sandstone** of Rogers and White⁷, belonging between the Brush Creek and Mahoning Coals, is present in considerable quantity in the region of the Cone-maugh outcrops, being, as a rule, coarse, massive, gray, and often pebbly. It is frequently impossible to differentiate it from the underlying Lower Mahoning, owing to the debris that covers the slopes where it is found. In conjunction with this lower ledge it is noted in the Wade Section, page 137, the Mouth of Anthony Creek Section, page 142, and is reported by Dr. Price on the top of the mountain 1.1 miles southeast of Birch River village, at an elevation of 2050' B., and also by the same authority as occurring partly concealed in a steep bluff, 3 miles northeast of the same village, at which point its elevation is 1855' B. So far as known it has not been quarried in the county, owing to its position high up in the ridges, but its massive and durable character would make it satisfactory for masonry where large blocks of stone are desired.

The **Sutton Limestone** of Hennen⁸, belonging just under

⁶I. C. White, Report Q, Sec. Geol. Survey of Penna.

⁷I. C. White, Vol. II, W. Va. Geol. Survey, p. 305; 1903.

⁸Ray V. Hennen, Braxton and Clay Report, W. Va. Geol. Survey, p. 218; 1917.

the Upper Mahoning Sandstone, and being described as siliceous, lenticular, and dark-gray in color at its type locality of Sutton, Braxton County, was not observed in Nicholas.

The **Middle Mahoning Sandstone** of Hennen⁹, described as a massive, bluish-gray, lenticular sandstone at its type locality in Clay County, was not observed in Nicholas.

The **Mahoning Coal** of White¹⁰, belonging in the interval separating the Upper and Lower Mahoning Sandstones and later determined by Hennen as coming just between the Middle Mahoning Sandstone and Thornton Fire Clay, was not observed in Nicholas, its horizon being usually covered by debris. Inasmuch as it is a thin and lenticular coal, seldom exceeding 1 foot in thickness, in the adjoining counties of Clay and Braxton, it can scarcely be considered as an economic deposit in Nicholas.

The **Thornton Fire Clay** of White¹¹, belonging just under the Mahoning Coal at the type locality of the former member in Taylor County, was not observed in Nicholas, being absent or covered by debris.

LOWER MAHONING SANDSTONE.

The **Lower Mahoning Sandstone** of Rogers and White¹², belonging in the interval separating the Thornton Fire Clay from the Uffington Shale, and being a coarse, massive stratum, similar in appearance and character to the Upper Mahoning, is present in the ridges of northwestern Nicholas, its outcrop being noted in conjunction with the Upper Mahoning in the sections for Wade, page 137, and Mouth of Anthony Creek, page 142, the intervals between the two members being concealed.

UFFINGTON SHALE.

The **Uffington Shale** of White¹³, named from its occurrence at Uffington, Monongalia County, being dark-gray in color, and carrying abundant plant fossils, and being the basal

⁹Ibid., pp. 221-222.

¹⁰I. C. White, Bull. 65, U. S. Geol. Survey, p. 96; 1891.

¹¹I. C. White, Vol. II, W. Va. Geol. Survey, pp. 322-323; 1903

¹²Ibid., p. 305.

¹³Ibid., p. 323.

member of the Conemaugh Series, was not noted in Nicholas, its horizon being covered by debris from the sandstones above. It is noted by Hennen as occurring at certain points in Braxton County, north of the Nicholas Line, and its presence in the latter county could doubtless be established by prospecting at the various localities where the Upper Freeport Coal occurs as described on subsequent pages, since it directly overlies this member.

GENERAL ACCOUNT AND SECTION, ALLEGHENY SERIES.

The Allegheny Series of the Pennsylvanian Rocks, described and named by the First Geological Survey of Pennsylvania, from its outcrop along the Allegheny River in that State, covers a considerable portion of northern and northwestern Nicholas. As shown by Map II, on which its areal extent is delineated, these sediments are mainly found in the high ridges, as most of the streams have cut into the Pottsville Series below the base of the Allegheny. The series begins with the top of the Upper Freeport Coal and extends down to the top of the Homewood Sandstone of the Pottsville, being from 300 to 350 feet thick, and composed largely of gray sandstones and gray shales which weather to a yellow, sandy soil. Besides several small coal seams of no economic importance, the series contains five minable coal beds, all of which have been prospected extensively, and used for local domestic fuel. Commercial mining has been done on a small scale in the Lower Kittanning and the Clarion. There are no limestones or iron ores of economic importance, although both occur in connection with some of the shales, but there are occasional beds of flinty or plastic fire clays, most of which are lenticular and of doubtful value. Lithologically the series contains approximately 69 per cent. of sandstone, 14 per cent. of shale, 9 per cent. of coal, and 8 per cent. of impure and siliceous limestone or iron ore.

The following General Section, compiled from the measured sections of Chapter IV, as well as from numerous other detailed observations, shows the Allegheny Series for Nicholas County:

General Section of the Allegheny Series for Nicholas County.

	Thickness. Feet.	Total. Feet.	
Coal, Upper Freeport, medium-soft, usually multiple-bedded	0 to 2	2	2'
Fire clay, Bolivar	0 to 6	8	
Limestone and Iron Ore, Upper Freeport, lenticular, usually represented by iron ore or sandy shale	0 to 7	15	
Sandstone, Upper Freeport, massive, gray, usually conglomeratic with large quartz pebbles	50 to 83	98	
Coal, Lower Freeport, medium-soft, lenticular	0 to 2	100	98'
Limestone and Iron Ore, Lower Freeport, usually iron, 0' to 1' thick, interbedded in fire clay shale or sandy shale, having total thickness of	10 to 15	115	
Sandstone, Lower Freeport, massive, coarse, gray, sometimes pebbly.....	20 to 49	164	
Coal, Upper Kittanning "Rider," seldom found	0 to 1	165	
Shale, sandy	0 to 25	190	
Coal, Upper Kittanning, usually hard and splinty, multiple-bedded	2 to 5	195	95'
Fire clay, Upper Kittanning, flinty, (not often found in Nicholas).....	0 to 5	200	
Shale, sandy	5 to 10	210	
Sandstone, Upper East Lynn, massive or current-bedded, grayish-brown, sometimes pebbly	30 to 50	260	
Coal, Middle Kittanning, double-bedded, medium-hard, with gas and semi-splint layers	2 to 5	265	70'
Sandstone, East Lynn, massive, gray or brown, sometimes pebbly	25 to 45	310	
Coal, Lower Kittanning (No. 5 Block) multiple-bedded, usually soft at top and splinty in lower portion.....	4 to 10	320	55'
Fire clay, Lower Kittanning, seldom found	0 to 5	325	
Limestone, Vanport, Ferriferous, seldom found	0 to 5	330	
Sandstone, Kittanning, gray, massive, (frequently absent)	0 to 15	345	
Coal, Clarion, multiple-bedded, (frequently absent)	0 to 5	350	30'
Sandstone, Homewood (top of Pottsville) ..	..	..	..

DESCRIPTION OF MEMBERS, ALLEGHENY SERIES

UPPER FREEPORT COAL.

The Upper Freeport Coal of the First Geological Survey

of Pennsylvania, lying at the top of the Allegheny Series, was noted at various points in northern and northwestern Nicholas, but apparently attains commercial minable thickness in few, if any, localities. Owing to its poor development and to the additional fact that it lies in the tops of the ridges where it is much less accessible than the thick coals that lie below it, little attempt has been made to prospect for it. It was noted in some of the high ridge roads where its blossom is frequently visible above the massive Upper Freeport Sandstone, but seldom appears to have more than one foot of thickness, although instances of two to three feet have been reported. In Braxton County, north of the Nicholas line, where it has been prospected at several points, it is a medium-soft coal, usually containing a slate parting near the middle. The following exposures, all of which are in Hamilton District, were noted:

Coal Blossom—No. 1 on Map II.

In road, east of Strange Creek, 2.6 miles S. 17° E. of Wade; Upper Freeport Coal; elevation, 1515' B.; coal blossom.

Coal Blossom—No. 2 on Map II.

On west hillside of Slabcamp Run, 1.7 miles S. 36° E. of Wade; Upper Freeport Coal; elevation, 1515' B.; coal blossom.

James Rose Prospect—No. 3 on Map II.

On the ridge north of Birch River and 0.8 mile north of Skyles; Upper Freeport Coal; elevation, 2125' B.
Opening closed, reported 2 feet thick.

Coal Blossom—No. 4 on Map II.

On Powell Mountain, in road, 3.1 miles northeast of Hookersville; Upper Freeport Coal; examined by Price; elevation, 2370' B.

	Ft.	In.
Sandstone and concealed, with pebbles .. .. .	..	..
Coal	0	6
Fire clay shale		

Coal Blossom—No. 5 on Map II.

On Powell Mountain, in road, 2.7 miles northeast of Hookersville; Upper Freeport Coal; examined by Price; elevation, 2385' B.

	Ft.	In.
Sandstone and concealed, with pebbles.....		
Upper Freeport Coal.....
Fire clay shale		

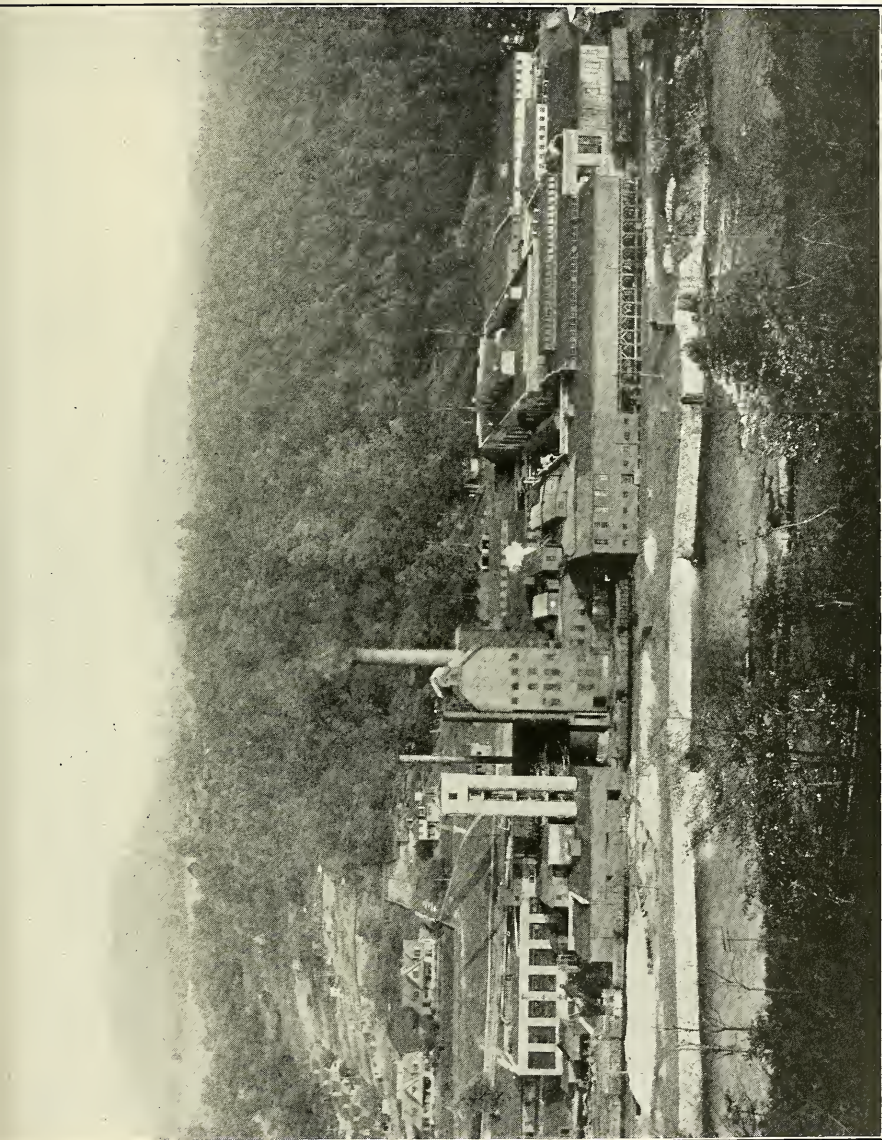


Photo by Robertson Studio, Richmond.
PLATE VIII.—Looking south from Dain, showing Topography of Kanawha and New River Groups;
Cherry River in foreground; paper mill in center.

Coal Blossom—No. 6 on Map II.

On Powell Mountain, in road, 2.5 miles northeast of Hookersville; **Upper Freeport Coal**; examined by Price; elevation, 2400' B.; coal blossom.

Coal Blossom—No. 7 on Map II.

On west hillside of Brushy Fork of Muddlety Creek, 2.2 miles N. 23° E. of Hookersville; **Upper Freeport Coal**; examined by Price; elevation, 2440' B.; coal blossom.

Coal Blossom—No. 8 on Map II.

On Powell Mountain, 2.1 miles northeast of Hookersville; **Upper Freeport Coal**; elevation, 2435' B.; coal blossom on top of sandstone.

BOLIVAR FIRE CLAY.

The **Bolivar Fire Clay**, first described and named by Pennsylvania geologists from its occurrence near the town of that name in Westmoreland County, Pennsylvania, and belonging just under the Upper Freeport Coal, was not noted in typical character in Nicholas, being usually represented by a few feet of fire clay shale or sandy shale.

UPPER FREEPORT LIMESTONE AND IRON ORE.

The **Upper Freeport Limestone** of the First Geological Survey of Pennsylvania, named from its close relationship to the Freeport Coals in that State, and often having iron ore associated with it in northern West Virginia, was not noted in typical form in Nicholas, except at the northern end of Powell Mountain, one-fourth mile east of Young's Monument, where it appears as a botryoidal deposit below the coal, having an elevation of 2235' B., but as a rule is represented only by thin lenses of iron, the same being too thin or irregular to be used for any purpose other than as stratigraphic markers.

UPPER FREEPORT SANDSTONE.

The **Upper Freeport Sandstone**, named by Pennsylvania geologists from its occurrence in that State in conjunction with the Freeport Coals, is a massive, cliff-forming horizon in northern Nicholas, its prevailing color being gray. It varies from 25 to 85 feet in thickness, and as a rule contains

numerous quartz pebbles, frequently one-half inch or more in diameter. In Chapter IV it is noted in the measured sections for Anthony Creek (Mouth), Birch River, Camden-on-Gauley, Fockler Branch of Muddlety, Harriet, Hookersville, and Skyles.

In **Grant District** it was noted along the road on the hillside north of Robinson Fork of Buffalo Creek, 1.4 miles southeast of Harriet, carrying pebbles and having an elevation of 2010' B.

In **Summersville District** it was observed on the hill west of Robinson Fork of Buffalo Creek, 1.5 miles northeast of Dade, being pebbly and its top having an elevation of 1875' B. It was also noted along the road south of the same stream, 2.5 miles northwest of Muddlety, its top having an elevation of 2210' B.

In **Hamilton District** it was noted along Taylor Creek on the west side of a branch, 2.1 miles northwest of Hookersville, being pebbly and having an elevation of 2120' B. It was observed at several points along Strange Creek, forming an immense deposit, 115 feet thick, at a point 1.5 miles northwest of Dille, its elevation being 1490' B. On the hill 2 miles southeast of Dille it is massive and pebbly, with an elevation of 1955' B.; and 3.2 miles southeast of the same village it is massive, pebbly at top, coming at an elevation of 2185' B. On the upper waters of Birch River it is prominent, being at the top of the mountain north of the river and 3.5 miles southwest of Waggy, where it contains pebbles, and has a basal elevation of 2010' B., there being 25 feet of it still remaining in the ridge. Along the top of Powell Mountain, between Birch River and Hookersville, it may be seen at numerous points in the public road, its thickness varying from 50 to 100 feet, and its character being that of a coarse conglomerate. Without doubt the presence of this great resistant stratum has been the prime factor in preserving the Powell Mountain at its present height. The ledge is reported by Price in the hilltop between Lower Spruce Run and Paddy Run of Muddlety Creek, 0.8 mile northwest of Hookersville, having an elevation of 2425' B., and containing white quartz pebbles. On the waters of the same creek, 2.5 miles northeast of Muddlety

village, it is visible again, having an elevation of 2410' B., and being pebbly, coarse, and massive, as usual. It is reported again by Price, 0.7 mile northeast of Opal, coming in the top of a knob, and having an elevation of 2530' B., and containing large white pebbles. The same authority reports it as forming the top of a flat knob, 4 miles northwest of Tioga, with an elevation of 2515' B., and having large quartz pebbles; and also on the south hillside of Rockhouse Run, 3.8 miles northwest of Tioga, at an elevation of 2415' B.

No quarries were observed on this ledge, as its position is high in the ridges and its outcrop is in a region where little heavy engineering work has been done, but its character would make it suitable for masonry construction where large blocks of stone are desired.

LOWER FREEPORT COAL.

The Lower Freeport Coal of the First Geological Survey of Pennsylvania, belonging just under the Upper Freeport Sandstone, and being 75 to 100 feet below the Upper Freeport Coal in Nicholas County, is poorly developed in a considerable portion of that region where its horizon is present, but in a small portion of Hamilton District west of Tioga thickens to commercial size. In this locality it is two to five feet in thickness, with some small streaks of bone, the coal being partly soft and gaseous and partly splinty. Elsewhere it is represented by a streak of fire clay or a thin seam of coal not fit for mining. Its areal extent, character, and thickness, together with detailed bed-sections, will be discussed in Chapter X, under the subject of "Commercial Coal", and the outcrop of the supposed minable extent is delineated on Map II.

LOWER FREEPORT LIMESTONE AND IRON ORE.

The Lower Freeport Limestone, of the Pennsylvania geologists, was seldom noted in Nicholas, but in the adjoining county of Braxton its accompanying iron ore is reported by Hennen¹⁴, as being frequently present in the form of thin

¹⁴Ray V. Hennen, Braxton and Clay Report, W. Va. Geol. Survey, p. 234; 1917.

lenses of hollow, kidney ore. It seems probable that the same formation might be uncovered by prospecting in Nicholas, but as it would undoubtedly prove to be thin and lenticular it would not be a commercial asset. In Hamilton District its presence was noted near the ridge road north of Birch River and 1.6 miles northwest of Skyles, where both iron ore and flint fire clay are visible, at an elevation of 2000' B.

LOWER FREEPORT SANDSTONE.

The **Lower Freeport Sandstone**, of Lesley and White, named from its occurrence in the vicinity of Freeport, Pennsylvania, where it is often separated into two divisions by the Upper Kittanning Coal with its accompanying shales, was noted at numerous points in northern and northwestern Nicholas. For reasons already given in recent Reports of the Survey¹⁵, the name "Lower Freeport Sandstone" has been limited to the upper division of the ledge, being that portion which belongs between the Lower Freeport and Upper Kittanning Coals. In Nicholas it is a massive, gray, coarse stratum, sometimes pebbly, 25 to 50 feet in thickness, frequently forming cliffs, and being usually noticeable at its proper horizon. Its position at any point may readily be determined by reference to Map II, on which the outcrop of the Upper Kittanning Coal is delineated, the sandstone being just above the coal. In Chapter IV it is noted in the sections for Anthony Creek (Mouth), Bentree, Fockler Branch of Muddlety Creek, Hardway Branch of Twentymile Creek, Harriet (North), Harriet (South), Hookersville, Isom Branch of Robinson Fork, Shant Branch of Powell Creek, and Wade.

In Hamilton District, where its outcrop is mainly found, it was noted on the mountainside west of Shant Branch of Powell Creek, 2.6 miles southwest of Birch River village, at an elevation of 1875' B., where it makes a massive cliff 40 feet thick. At another locality on the same mountainside, 3 miles southwest of Birch River, it is 30 feet thick, coarse and

¹⁵Ray V. Hennen. Braxton and Clay Report, W. Va. Geol. Survey, p. 234; 1917. D. B. Reger. Barbour, Upshur, and Western Portion of Randolph Report, W. Va. Geol. Survey, p. 249; 1918.

buff colored, with an elevation of 1950' B. On the north side of Birch River, 3.1 miles southwest of Waggy, it is a massive ledge, its top having an elevation of 2000' B. On the east side of Clear Fork of Muddlety Creek, 3.4 miles west of Tioga, it is reported by Price as a white, weathered ledge, having an elevation of 2415' B.

So far as known this ledge has not been quarried in the county, probably due to the same reasons as outlined above for the Upper Freeport Sandstone. Its massive and durable character, however, would make it suitable for engineering structures where large blocks are desired.

The **Upper Kittanning "Rider" Coal**, of Hennen¹⁶, coming just under the Lower Freeport Sandstone, and sometimes being one foot or more in thickness in western Braxton and Clay Counties, was not observed in Nicholas.

UPPER KITTANNING COAL.

The **Upper Kittanning Coal**, of White, Platt and Lesley, named from its occurrence near the town of Kittanning, Pennsylvania, and usually coming just a few feet below the Lower Freeport Sandstone, occurs in considerable quantity in northern and northwestern Nicholas where its horizon is found. It varies from 2 to 5 feet in thickness, being usually multiple-bedded, and generally hard and splinty, although gaseous layers are frequently found. It has been prospected for local domestic fuel at various points, for which purpose, as well as for commercial shipment, it is well adapted. Its areal extent, character, thickness, and chemical quality, together with detailed bed-sections, will be discussed in Chapter X, under the subject of "Commercial Coal," and the outcrop of its supposed minable extent is delineated on Map II.

The **Upper Kittanning Fire Clay**, of Hennen¹⁷, coming just under the Upper Kittanning Coal at its type locality along the Monongalia-Preston line, was not observed in typical form in Nicholas, its horizon being occupied by sandy or fire clay shale.

¹⁶Ray V. Hennen, Braxton and Clay Report, W. Va. Geol. Survey, p. 235; 1917.

¹⁷Ray V. Hennen, Monongalia, Marion and Taylor Report, W. Va. Geol. Survey, p. 344; 1913.

UPPER EAST LYNN SANDSTONE.

The **Upper East Lynn Sandstone** of Hennen¹⁸, occupying most of the interval between the Upper Kittanning and Middle Kittanning Coals, and probably representing the horizon formerly termed the Lower Division of the Lower Freeport Sandstone, is a prominent stratum in northern and northwestern Nicholas, where its horizon is found. As a rule it is massive, gray or brown in color, sometimes pebbly, and often forms cliffs, its thickness varying from 30 to 50 feet. In Chapter IV it is noted in the sections for Anthony Creek (Mouth), Dade, Fockler Branch of Muddlety Creek, Hardway Branch of Twentymile Creek, Harriet (North), Harriet (South), Hookersville, Mudlick Run of Anthony Creek, and Shant Branch of Powell Creek. In **Hamilton District** it makes a massive cliff on the east side of Birch River, 0.7 mile northwest of Birch River village, being 30 feet thick and having an elevation of 1560' B. In **Beaver District** it was observed on the northeastern slope of Burnt Knob, 1.6 miles southeast of Calvin, being massive and pebbly and having an elevation of 2055' B.

So far as known this ledge has not been quarried, as its outcrop is mainly in a region where stone has been little used in construction of any sort, but its massive and durable character would make it well adapted for engineering structures.

MIDDLE KITTANNING COAL.

The **Middle Kittanning Coal**, named by Platt, White, and Chance from its occurrence between the Upper and Lower Kittanning Coals in western Pennsylvania, occurs in large quantity in northern and northwestern Nicholas. Its interval below the Upper Kittanning varies from 50 to 70 feet, being usually near the latter figure, but its interval above the Lower Kittanning is extremely variable, there frequently being only a few feet of shale, while at many points the lenticular East Lynn Sandstone intervenes, making an interval of 50 to 70 feet. As a rule the Middle Kittanning Coal is double- or multiple-bedded, quite splinty in character, and is frequently

¹⁸Ray V. Hennen, Braxton and Clay Report, W. Va. Geol. Survey, pp. 237-240; 1917.

high in ash. Its areal extent, character, thickness, and chemical quality, together with detailed bed-sections, will be discussed in Chapter X, under the subject of "Commercial Coal".

EAST LYNN SANDSTONE.

The **East Lynn Sandstone** of Krebs¹⁹, named from the village of East Lynn, Wayne County, and defined as occupying most of the interval between the Upper Kittanning (North Coalburg?), and Lower Kittanning (No. 5 Block) Coals, and later limited by Hennen²⁰, to the ledge lying between the Middle and Lower Kittanning Coals, is of wide occurrence in northern and northwestern Nicholas. Its character is similar to that of the Upper East Lynn, being usually massive, gray or light-brown in color, sometimes pebbly and frequently forming cliffs, its thickness varying from 25 to 45 feet, as a rule, although it is sometimes entirely absent, owing to the thinning of the interval between the two coals. In Chapter IV it is recorded in the sections for Anthony Creek (Mouth), Birch River, Dade, Hardway Branch of Twentymile Creek, Hookersville, Mudlick Run of Anthony Creek, and Rich Fork of Anthony Creek.

In **Hamilton District** it is reported by Price as making a cliff along the hillside east of Mill Creek of Birch River, 3.5 miles southwest of Waggy, at an elevation of 1625' B., being white, hard, and pebbly, and 35 feet thick. On a short branch of Birch River, 2.6 miles northeast of Birch River village, it makes a massive cliff at an elevation of 1775' B. It is reported again by Price as forming the top of a hill on the west slope of Back Fork of Muddlety Creek, 2.2 miles northwest of Calvin, at an elevation of 2600' L.

No quarries were observed on this ledge, but its massive and durable character would adapt it well for massive masonry construction or for concrete aggregate.

LOWER KITTANNING (NO. 5 BLOCK) COAL.

The **Lower Kittanning Coal**, named by J. P. Lesley from

¹⁹C. E. Krebs, Cabell, Wayne, and Lincoln Report, W. Va. Geol. Survey, pp. 183-184; 1913.

²⁰Ray V. Hennen, Braxton and Clay Report, W. Va. Geol. Survey, pp. 241-245; 1917.

its occurrence in Armstrong County, Pennsylvania, and later termed **No. 5 Block** by White²¹ from its occurrence in the Great Kanawha Valley in the vicinity of Montgomery, Fayette County, where it had long been mined under that name, is an important and valuable seam in northern and northwestern Nicholas. For reasons fully explained in a former Report by the writer²² it has now been determined that the name of **Lower Kittanning Coal** deserves precedence over the title of **No. 5 Block** and the former will be so employed in this Report, although the wide-spread use of the latter makes its retention in parentheses advisable.

The Lower Kittanning (No. 5 Block) Coal in Nicholas County occurs just under the East Lynn Sandstone wherever this stratum appears in the measures, and has a varying interval of 5 to 55 feet below the Middle Kittanning Coal, due to the lenticular character of the sandstone named. Its interval from the top of the Homewood Sandstone varies from 10 to 50 feet, the intervening members of the Allegheny Series being frequently very thin or entirely absent. The thickness of the coal varies from 4 to 10 feet, being nearly always multiple-bedded, and usually soft in the upper portion and splinty in the lower half. It has been mined on an extensive scale for many years at the town of Widen, on Buffalo Creek, Clay County, less than one mile from the Nicholas line, where it has established an enviable reputation for purity and general excellence. Since field work was completed in Nicholas a commercial mine has been opened in the vicinity of Tioga, where the coal has been extensively prospected. It has been mined at numerous points in northern Nicholas for local domestic fuel, for which purpose it has given eminent satisfaction. Its areal extent, character, thickness, and chemical quality, together with detailed bed-sections, will be discussed in Chapter X, under the subject of "Commercial Coal," and the outcrop of its supposed minable extent is engraved on Map II.

LOWER KITTANNING FIRE CLAY.

The **Lower Kittanning Fire Clay** of White, named from

²¹I. C. White, Vol. II(A), W. Va. Geol. Survey, pp. 525-528; 1908.

²²Webster Report, W. Va. Geol. Survey, p. 137; 1920.

its occurrence just below the Lower Kittanning Coal, was seldom observed in Nicholas County, but its presence is noted in the section for Skyles, page 147, where it is apparently about five feet thick at its outcrop on the mountainside north of the village, being plastic and somewhat sandy. It apparently offers no opportunity for commercial exploitation in the county.

VANPORT (FERRIFEROUS) LIMESTONE.

The **Vanport (Ferriferous) Limestone**, belonging just under the Lower Kittanning Fire Clay, and carrying marine fossils in Ohio and western Pennsylvania but seldom found in West Virginia, was not observed in Nicholas, but a limestone at this horizon was observed in Webster County, on the waters of Birch River, 1.2 miles northeast of Boggs, where it crops in the public road just below an opening in the Lower Kittanning Coal, there being nodules of ferruginous limestone bedded in 20 feet of shale. No fossils were observed, but a careful search was not made.

The **Kittanning Sandstone** of White²³, named from the fact that it underlies the Lower Kittanning Coal by only a few feet at its type locality in western Pennsylvania, was not observed in Nicholas, as its horizon is apparently occupied by sandy shale, but lenticular deposits of it might possibly be found in certain localities.

CLARION COAL.

The **Clarion Coal**, so named by the First Geological Survey of Pennsylvania from the town of that name in the north-western part of the State, occurs in commercial thickness and quality in certain restricted localities in Nicholas, but in general is lenticular in its nature. In those regions where it is found it is multiple-bedded and similar in character to the Lower Kittanning, having both gaseous and splinty layers. Since field work was completed in the county a commercial mine has been opened on this bed in the vicinity of Tioga. Its areal extent, character, thickness, and chemical quality, together with detailed bed-sections, will be discussed in Chapter X, under the subject of "Commercial Coal". Its outcrop is

²³I. C. White, Bull. 65, U. S. Geol. Survey, p. 172; 1891.

not sketched on Map II, since its position—20 to 30 feet below the Lower Kittanning Coal, and 5 to 10 feet above the top of the Pottsville Series—renders its stratigraphic location at any point readily determinable from either of these two definite horizons, both of which are shown on the map.

CHAPTER VI.

STRATIGRAPHY--KANAWHA GROUP OF THE POTTSVILLE SERIES

GENERAL ACCOUNT AND SECTION OF THE POTTSVILLE SERIES.

The **Pottsville Series** was first named and described by Pennsylvania geologists from its occurrence at Pottsville, eastern Pennsylvania, where it has numerous beds of conglomeratic sandstones, separated by anthracite coal seams and shales. Later it was subdivided by Dr. I. C. White¹ into the Upper Pottsville, or Kanawha Group, the Middle Pottsville, or New River Group, and the Lower Pottsville, or Pocahontas Group. Of these titles custom has sanctioned the use of the geographic names last mentioned, on account of the close application of the Kanawha and New River to the coal fields of southern West Virginia and of the Pocahontas to the field of that name in southwestern Virginia and southern West Virginia, and for that reason they will be used exclusively in this Report. Of the above-named groups the Pottsville Series is represented in Nicholas mainly by the Kanawha and New River, no coals of the Pocahontas having been noted either at outcrop or in borings, and only a few of the sandstones and shales having been questionably identified in certain borings in the vicinity of Deepwell. It is possible, however, that some of the Pocahontas coals may exist in small quantity in the extreme southwestern corner of the county, since they have been found in a boring in Greenbrier County, not far from the Nicholas line. As outlined on Map II the Pottsville covers a large proportion of the county, often making an extremely rough topography, and sometimes being responsible for extensive table-lands or glades. A physical description of

¹I. C. White, Vol. II(A), W. Va. Geol. Survey, p. 13; 1908.

each group will be given under its proper heading on subsequent pages.

The following general section has been compiled to show the full development of the Pottsville Series in Nicholas. By way of introduction it may be said that Nicholas occupies a position intermediate between the Pennsylvania State Line, where the Pottsville is only about 250 feet thick, and the Virginia State Line, adjoining McDowell County, where the Kanawha Group exhibits a maximum thickness of 2100 feet, the New River Group a maximum of 1030 feet, and the Pocahontas a maximum of 720 feet, making a total of 3850 feet for the Pottsville sediments. In contrast with these two extremes the general section for Nicholas shows a maximum of 1200 feet for the Kanawha, 800 for the New River, and 235 for the Pocahontas, making a total of 2235 feet for the entire Pottsville, or less than two-thirds of the maximum development of southern West Virginia. Reduced to decimals the Kanawha Group of Nicholas is 57.1 per cent. of the McDowell County maximum, the New River is 77.1 per cent., and the Pocahontas is only 32.6 per cent. It is thus apparent that many of the coals and sandstones of the Kanawha and Pocahontas found in McDowell, Raleigh, and Fayette are necessarily thin or absent in Nicholas, while the New River has retained a greater proportion of its full thickness. Compared to northern West Virginia and western Pennsylvania, the Pottsville of Nicholas has increased nearly ten-fold, and exhibits many coals and other members not found in the former region.

Owing to the fact that geologic study of the Pottsville was first undertaken in Pennsylvania, followed by an almost entirely distinct classification in southern West Virginia in the region of maximum thickness, with a nomenclature of its own, made necessary because of the fact that none of the Pennsylvania formations had then been definitely traced through the central counties of West Virginia, it has been necessary in the present volume to employ two distinct titles for several important horizons the identity of which now seems subject to little further doubt. Precedence is given mainly to the Pennsylvania nomenclature in those members

coming above the Kanawha Black Flint, because of their general use in the many Reports of that State. Below and including the Black Flint the nomenclature of southern West Virginia has been employed, because of the overwhelming amount of geologic and commercial literature that contains these titles, the older Pennsylvania names being given in parentheses where it has been possible to apply them with reasonable certainty.

Further attention is called to the fact that not all members of the Kanawha and New River Groups heretofore recognized in previous publications have been included in the general section published below, only those definitely identified in the county having been listed, but mention is made of all members in the descriptions on subsequent pages. It is quite certain that several of these members do not exist in the county but it is equally likely that a number of them will eventually be found within its borders when close drilling or prospecting has finally been completed over wide areas that are now covered with dense forest growth or where the main mass of sediments is buried under drainage. It is believed that the mention of these members at their proper places in the description of members will greatly aid in whatever search may be made for them in the future.

By referring to the measured sections published in Chapter IV it will be noted that many of the various Pottsville sandstone ledges frequently have a much greater thickness than the maximum noted in the general section, this apparent discrepancy being due to the fact that the individual members frequently develop local thick lenses, usually compensated by a corresponding thinning of other members above or below. To have incorporated these excessive thicknesses in the general section would have distorted the prevailing intervals between important coals. Reference to the tables of intervals above and below the Eagle and Sewell Coals, pages 95-98, will show that the maximum intervals given in the general section correspond most closely to those which prevail in the central and southern portions of the county, as there is a considerable thinning toward the north and northeast:

General Section of the Pottsville Series for Nicholas County.

	Thickness.		Total.
	Feet.	Feet.	Feet.
Sandstone, Homewood, massive, gray, sometimes pebbly, prominent in northern portion of county	50 to	88	88
Coal, Stockton "A", (Upper Mercer) lenticular	0 to	2	90
Shale, sandy or dark, with lenticular sandstones	10 to	65	155
Kanawha Black Flint (Mercer Limestone of Pa.), dark shale with marine fossils in northeastern part of county, gray chert along northwestern boundary	2 to	5	160
Coal, Stockton (Lower Mercer of Pa.) multiple-bedded, usually medium-soft, with some splinty layers...	1 to	5	165
Fire clay shale	0 to	4	169
Sandstone, Upper Coalburg, (Upper Connoquenessing of Pa.)	20 to	30	199
Shale, sandy	0 to	5	204
Coal, Coalburg "A"	0 to	1	205
Shale, Coalburg, black, argillaceous, with marine fossils on Birch River	0 to	5	210
Coal, Coalburg, (Quakertown "Rider"?), multiple-bedded, usually splinty in lower half, mined in Jefferson District	2 to	10	220
Black slate, Quakertown, (supposed position), contains <i>Lingula</i> and <i>Naiadites</i> fossils in Randolph County	0 to	9	229
Coal, Little Coalburg, not often found	0 to	1	230
Shale, sandy	0 to	5	235
Sandstone, Lower Coalburg, gray, massive	10 to	25	260
Sandstone, Upper Winifrede, gray, massive	10 to	26	286
Coal, Winifrede, (Quakertown? of Pa.), single- or multiple-bedded, usually splinty	1 to	4	290
Fire clay shale, impure, and sandy shale	5 to	10	300
Sandstone, Lower Winifrede, massive, gray	10 to	23	323
Coal, Chilton "A"	0 to	2	325
Limestone, Winifrede, nodular, often represented only by dark shale, both sometimes containing marine fossils	0 to	5	330
Sandstone, Upper Chilton, massive, gray	20 to	30	360
Shale, sandy	0 to	6	366
Coal, Chilton, single-bedded, medium-soft, with occasional benches of splint or cannel	1 to	4	370

	Thickness.	Total.
	Feet.	Feet.
Fire clay, impure, and sandy shale....	0 to 5	375
Sandstone, Lower Chilton, massive, gray	5 to 20	395
Sandstone, Hernshaw, massive, gray..	10 to 32	427
Coal, Hernshaw, multiple-bedded, usually worthless	0 to 3	430
Fire clay and sandy shale	1 to 5	435
Sandstone, Naugatuck, shaly, often absent	10 to 19	454
Coal, Dingess, may be same as Williamson of Mingo County.....	0 to 1	455
Shale, sandy	1 to 5	460
Sandstone, Williamson, gray, massive	5 to 20	480
Limestone, Dingess, usually represented by dark, sandy, or ferruginous shale, containing marine fossils in western Nicholas	0 to 6	486
Coal, Williamson, multiple-bedded, usually worthless	1 to 4	490
Fire clay and sandy shale.....	1 to 7	497
Sandstone, Upper Cedar Grove, massive, gray	10 to 38	535
Limestone, Seth, hard, gray, lenticular	0 to 2	537
Coal, Cedar Grove, usually thin.....	1 to 3	540
Fire clay, impure, and shale	1 to 5	545
Sandstone, Middle Cedar Grove, usually absent	0 to 15	560
Shale, sandy	1 to 5	565
Sandstone, Peerless, massive, gray, same as Lower Cedar Grove of former Reports	10 to 29	594
Coal, Alma "A", usually absent	0 to 1	595
Shale, sandy	0 to 2	597
Coal, Alma, sometimes multiple-bedded, and usually splinty.....	1 to 3	600
Fire clay, impure, and shale	0 to 5	605
Sandstone, Monitor, massive, gray, same as "Logan Sandstone" of Logan-Mingo Report	10 to 19	624
Coal, Little Alma	0 to 1	625
Limestone, Campbell Creek, gray, siliceous, usually absent but sometimes represented by "turtleback" concretions	0 to 1	626
Shale, sandy	5 to 20	646
Coal, Campbell Creek (Peerless Bench), multiple-bedded, soft, gas type, mined at Vaughan	2 to 4	650
Fire clay, impure, and sandy shale...	10 to 45	695
Coal, Campbell Creek (No. 2 Gas Bench), multiple-bedded, soft, gas type	2 to 5	700
Fire clay, impure, and sandy shale...	0 to 10	710
Sandstone, Brownstown, gray or brown, massive	20 to 40	750
Shale, sandy	0 to 8	758

	Thickness.	Total.
	Feet.	Feet.
Coal, Powellton, soft and gaseous at top, splinty at base.....	1 to 2	760
Shale, dark, laminated	0 to 7	767
Limestone, Stockton, "Cannelton," siliceous, lenticular, usually represented by black shale, carries <i>Naiadites</i> fossils on McMillion Creek	0 to 2	769
Coal, Eagle "A", seldom found.....	0 to 1	770
Sandstone, Eagle, gray, massive	10 to 20	790
Shale and Limestone, Newlon, dark, laminated	0 to 5	795
Coal, Eagle, medium-soft, multiple-bedded, mined at mouth of Bells Creek, and prospected for local fuel generally over northern Nicholas	2 to 5	800
Fire clay, impure, and sandy shale...	0 to 5	805
Sandstone, Decota, gray, massive ...	20 to 40	845
Shale, sandy	0 to 3	848
Coal, Little Eagle, usually soft and gaseous	1 to 2	850
Shale, sandy or sandstone	10 to 19	869
Coal, Cedar, usually slaty	0 to 1	870
Sandstone, Grapevine, gray, massive, usually absent	0 to 30	900
Shale, Eagle, black, laminated, with iron ore concretions and marine fossils, widely persistent	10 to 24	924
Limestone, Eagle, dark, hard, lenticular, with marine fossils.....	0 to 1	925
Shale, Eagle, black, laminated, with iron ore concretions and marine fossils	5 to 9	934
Coal, Little Cedar, seldom found	0 to 1	935
Sandstone, Lower War Eagle, shaly or flaggy	5 to 13	948
Coal, Lower War Eagle, soft, multiple-bedded, impure	1 to 2	950
Shale, sandy	1 to 5	955
Sandstone, Upper Gilbert, massive, gray, medium-grained, frequently absent	0 to 30	985
Shale, dark, laminated, contains horizon of <i>Oceana</i> Limestone, which was not observed in Nicholas....	5 to 15	1000
Sandstone, Lower Gilbert, massive, grayish-brown, coarse, sometimes pebbly, quarried extensively at Summersville, also underlies the glades between that point and Camden-on-Gauley	30 to 60	1060

	Thickness.	Total.	
	Feet.	Feet.	
Shale, Gilbert, dark, laminated, siliceous, carrying marine fossils at Swiss, probable horizon of Dorothy? Limestone, which was not observed	0 to 10	1070	
Coal, Gilbert, multiple-bedded, soft, columnar, mined extensively for local use at Keslers Crosslanes and Sparks	2 to 5	1075	
Shale, sandy, lenticular	0 to 4	1079	
Sandstone, Dotson, gray or brown, massive, sometimes pebbly	20 to 40	1119	
Coal, Douglas "A" (seldom found)....	0 to 1	1120	
Shale, sandy, lenticular	0 to 4	1124	
Coal, Douglas, slaty and impure.....	0 to 1	1125	
Fire clay shale, sandy	0 to 10	1135	
Sandstone, Lower Dotson, gray or light-brown, massive, sometimes pebbly	20 to 50	1185	
Shale, Douglas, dark, sandy, laminated, contains brackish-water fossils near Persinger Ford.....	5 to 13	1198	
Coal, Lower Douglas, multiple-bedded, soft, columnar, often slaty and impure	1 to 2	1200	
New River Group (800')			
Sandstone, Upper Nuttall, massive, gray or brown, coarse and sometimes pebbly, often forms cliffs...	50 to 90	1290	
Shale, dark, sandy	0 to 8	1298	
Coal, laeger "B", multiple-bedded, soft, columnar, frequently absent.	0 to 2	1300	
Sandstone, Lower Nuttall, massive, brown, pebbly, forms great cliff along gorge of Gauley River.....	75 to 110	1410	
Shale, Upper laeger, dark, argillaceous, with plant fossils.....	0 to 13	1423	
Coal, Hughes Ferry, "laeger," single- or double-bedded, soft, columnar.	1 to 2	1425	
Shale, sandy	0 to 5	1430	
Sandstone, Middle laeger, massive, grayish-white	10 to 40	1470	
Shale, sandy, dark	0 to 3	1473	
Coal, Lower laeger, double-bedded, soft, columnar	1 to 2	1475	
Fire clay shale	0 to 3	1478	
Sandstone, Lower laeger, massive, gray or brown, medium-grained, micaceous	10 to 20	1498	
Shale, Lower laeger, dark-gray, argillaceous, laminated	5 to 10	1508	
Sandstone, Harvey Conglomerate, massive or current-bedded, grayish-white or brown, sometimes pebbly	10 to 30	1538	

210 STRATIGRAPHY--KANAWHA GROUP OF THE POTTSVILLE SERIES.

	Thickness.		Total.
	Feet.	Feet.	Feet.
Shale, Sandy Huff , dark-gray, argillaceous, laminated	0 to	10	1548
Coal, Castle , single- or double-bedded, soft, columnar	0 to	2	1550
Sandstone, Guyandot , massive, grayish-white, sometimes pebbly, forms cliff near Hominy Falls	20 to	50	1600
Shale, sandy, dark, Skelet	0 to	7	1607
Coal, Sewell "B" , multiple-bedded, soft, columnar	0 to	3	1610
Shale, sandy, laminated	0 to	24	1634
Coal, Sewell "A" , soft, columnar, seldom found	0 to	1	1635
Sandstone, Lower Guyandot , massive, grayish-white, sometimes pebbly, forms cliffs near Hominy Falls...	10 to	30	1665
Shale, Hartridge , dark, laminated, with iron ore and plant fossils, often carries brackish-water fossils.....	0 to	9	1674
Coal, Sewell (Sharon) , single- or double-bedded, soft, columnar, mined on Gauley River and at Saxman	2 to	6	1680
Shale, gray, sandy, often contains plant rootlets	5 to	10	1690
Sandstone, Welch , massive, grayish-white, sometimes replaced by shale or shaly sandstone	10 to	30	1720
Shale, dark, argillaceous, lenticular...	0 to	8	1728
Coal, Welch , multiple-bedded, soft, columnar	0 to	2	1730
Shale, gray, sandy	0 to	5	1735
Sandstone, Upper Raleigh (Sharon) , massive, grayish-white, often pebbly, sometimes forms cliffs.....	50 to	75	1810
Shale, sandy	0 to	9	1819
Coal, Little Raleigh , soft, columnar, not often found	0 to	1	1820
Shale, sandy	0 to	5	1825
Sandstone, Lower Raleigh , massive, gray, lenticular	0 to	40	1865
Shale, sandy	0 to	2	1867
Coal, Beckley , multiple-bedded, soft, columnar, usually absent	0 to	3	1870
Sandstone, Quinnimont , gray, massive, lenticular	0 to	40	1910
Shale, Quinnimont , dark-gray, siliceous, lenticular	0 to	15	1925
Coal, Fire Creek, "Quinnimont," multiple-bedded, soft, columnar	0 to	5	1930
Shale, sandy, with sandstone	10 to	29	1959
Coal, Little Fire Creek , not often found	0 to	1	1960
Sandstone, Pineville , grayish-white, massive, lenticular.....	0 to	35	1995

	Thickness.	Total.
	Feet.	Feet.
Shale, gray, sandy	0 to 5	2000
Pocahontas Group (235')		
Sandstone, Flattop Mountain, hard, white, noted only in borings at Deepwell	35 to 40	2040
Shale, Rift, dark, noted only in borings at Deepwell	50 to 80	2120
Sandstone, Pierpont, grayish-white, noted only in borings at Deepwell	50 to 60	2180
Shale, Royal, sandy, noted only in bor- ings at Deepwell	5 to 25	2205
Sandstone, Eckman, noted only in bor- ings at Deepwell	20 to 30	2235
Mauch Chunk Red Shales .....	..	....

GENERAL DESCRIPTION, KANAWHA GROUP OF POTTSVILLE.

The Kanawha Group of White², composing the upper portion of the Pottsville Series, and having a maximum thickness of 1200 feet in Nicholas, consists mainly of massive, gray sandstone beds, varying from 10 to 100 feet in thickness, separated by deposits of sandy or carbonaceous shales, with coal seams usually appearing somewhere between the successive layers of rock. Several of the shales frequently carry fossil shells and at least five of these have a distinctly marine phase. Many of the coal seams are somewhat lenticular, having a good development in some localities while in neighboring areas they become thin or disappear. The occurrence of the sandstones is lenticular, their thickness varying greatly from place to place, and the intervening shale beds sometimes disappearing locally so that the ledges often coalesce into massive cliffs, indicating much irregularity in old shore-lines of the Paleozoic sea. As defined in Nicholas, the group varies in thickness from about 850 feet in the vicinity of Tioga, at the northeastern corner of the county, to 1200 feet in the neighborhood of Keslers Crosslanes and Belva in the southwestern corner, making a southwestward increase of more than 40 per cent. Several new coals and sandstones, not known to occur at Tioga, become well developed in the region of greater thickness, and certain fossiliferous shales ap-

²I. C. White, Vol. II(A), W. Va. Geol. Survey, p. 13; 1908.

pear in the measures that could not be found at the former locality. Most of the coals above the Campbell Creek seam contain benches of splint or semi-splint, closely associated with softer layers, but below and including the Campbell Creek they are mainly of the medium-soft and gaseous type. Most of the splint coals are multiple-bedded and thick, while those of the gaseous type are more often single-bedded and thin.

Lithologically the Kanawha Group contains approximately 61.5 per cent. of sandstone, 30.3 per cent. of shale, 6.4 per cent. of coal, and 1.8 per cent. of impure and siliceous limestone. The great percentage of sandstone and sandy shale and the lack of thick limestones combine to make a soil that is usually thin and poor.

The topography of those regions where the upper and lower members of the group outcrop is usually very rough and rugged, but in those localities where the intermediate members appear, more gentle slopes prevail, owing to the great proportion of soft shale and shaly sandstone.

DESCRIPTION OF MEMBERS, KANAWHA GROUP OF POTTSVILLE.

HOMEWOOD SANDSTONE.

The **Homewood Sandstone**, named by Dr. I. C. White from its outcrop in Beaver County, western Pennsylvania, and coming at the top of the Pottsville Series, is usually found in massive development wherever its horizon occurs in Nicholas. As a rule it is grayish-white, hard and coarse, often carrying medium-sized quartz pebbles, and varying in thickness from 30 to 100 feet. In the northern portion of the county its outcrop may be noted at frequent points in Jefferson, Grant, Summersville, Hamilton, and Beaver Districts, cliffs being frequent. In Chapter IV its character and thickness are noted in detail in the sections for Anthony Creek (Mouth), Camden-on-Gauley, Dade, Fockler Branch of Muddlety, Gilboa, Hardway Branch of Twentymile, Harriet (North), Harriet (South), Herold, Hookersville, Isom Branch of Robinson Fork, Lockwood, Mudlick Run of Anthony, Rich Fork of Anthony, Muddlety, Skyles, Summersville, and Swiss. So far as known it

has not been quarried but its character is such that it could be used for heavy masonry in structures where service and durability rather than architectural effect are desired. Its position at any point may be determined by referring to the Lower Kittanning (No. 5 Block) Coal, the outcrop of which is delineated on Map II, and beneath which the Homewood comes by an interval varying from 10 to 50 feet. The outcrop of the Homewood Sandstone, which coincides with the top of the Kanawha Group, is also shown on Map II.

STOCKTON "A" (UPPER MERCER) COAL.

The **Stockton "A" Coal** of Hennen³, being apparently the same as the **Upper Mercer Coal** of the Second Geological Survey of Pennsylvania, and coming just below the Homewood Sandstone, from which it is sometimes separated by a thin bed of dark or sandy shale, is a lenticular, multiple-bedded seam, its thickness varying from 1 to 5 feet when found. Owing to its lenticular character and the great number of slate partings that it contains it can not be classed as a commercial fuel but would supply a limited amount of domestic coal, should necessity require its use. The following openings and exposures were noted in the northern portion of the county :

Coal Blossom—No. 243 on Map II.

Summersville District, on ridge road between Beech Fork and Robinson Fork, 0.9 mile southeast of Dade; **Stockton "A" (Upper Mercer) Coal**; elevation, 1945' B.

Coal blossom, thickness not determined.

Coal Blossom—No. 244 on Map II.

Hamilton District, on hillside south of Birch River, 0.3 mile N. 75° W. of Birch River village; **Stockton "A" (Upper Mercer) Coal**; elevation, 1485' B.

Coal blossom, thickness not determined.

Jas. W. Hoover Coal Mine—No. 245 on Map II.

Hamilton District, on hillside south of Mill Creek, 1.3 miles N.

³Ray V. Hennen, Braxton and Clay Report, W. Va. Geol. Survey, pp. 253-255; 1917.

47° E. of Birch River village; **Stockton "A"** (Upper Mercer) Coal; elevation, 1530' B.; observation by Price.

			Ft.	In.
Sandstone, massive .....			..	..
Coal, soft	0'	4½"		
Shale, fissile, black, "draw slate" ...	0	1		
Shale, gray, argillaceous	0	6		
Coal, medium-hard	0	10		
Shale, gray	0	2		
Coal, medium-hard	0	4½	2	4
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Shale, gray, and fire clay.....				

T. G. Barnett Coal Mine—No. 246 on Map II.

Hamilton District, on hillside north of Mill Creek, 1.7 miles N. 28° E. of Birch River village; **Stockton "A"** (Upper Mercer) Coal; elevation, 1475' B.; observation by Price.

			Ft.	In.
Shale, bituminous .....			..	..
Shale, black			0	2
Bone and shale			0	4½
Coal, medium-soft	0'	9½"		
Shale	0	1		
Coal, medium-soft	1	3		
Shale, dark-gray, argillaceous.....	0	10		
Coal	0	2		
Shale, gray, argillaceous	0	1½		
Coal	0	3½	3	6½
<hr/>				
Shale, pavement				

Widow Fox Coal Mine—No. 247 on Map II.

Hamilton District, on hillside north of Mill Creek, 1.9 miles N. 39° E. of Birch River village; **Stockton "A"** (Upper Mercer) Coal; elevation, 1485' B.; observation by Price.

Fallen shut, thickness unknown.

Tioga Lumber Company Coal Prospect—No. 248 on Map II.

Hamilton District, on hillside north of Mill Creek, 1.9 miles N. 39° 4.0 miles S. 29° E. of Birch River village and 1.9 miles S. 5° E. of Anthony Creek School; **Stockton "A"** (Upper Mercer) Coal; elevation, 1940' B.

			Ft.	In.
Shale, sandy, gray			3	0
Coal	0'	1"		
Shale	0	11		
Coal	0	10	1	10
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Slate, pavement				

Tioga Lumber Company Coal Prospect—No. 249 on Map II.

Hamilton District, on hillside west of Anthony Creek, 4.3 miles S. 48° E. of Birch River village and 2.1 miles S. 29° E. of Anthony Creek School; Stockton "A" (Upper Mercer) Coal; elevation, 1970' B.

	Ft.	In.
Sandstone, massive .....		..
Slate, black, bony	1	0
Fire clay and shale	4	0
Coal, thickness concealed.....		

Tioga Lumber Company Coal Prospect—No. 250 on Map II.

Hamilton District, on hillside west of Pantherlick Branch of Poplar Creek, 2.6 miles N. 32° W. of Tioga; Stockton "A" (Upper Mercer) Coal; elevation, 1905' B.

Little coal on dump, thickness unknown, prospect closed.

Coal Exposure—No. 251 on Map II.

Hamilton District, on road west of Brushy Fork of Muddlety Creek, 1.1 miles northeast of Hookersville; Stockton "A" (Upper Mercer) Coal; elevation, 2103' L.; for details, see Hookersville Section, page 148.

Andrew McCoy Coal Mine—No. 252 on Map II.

Hamilton District, on hillside north of Brushy Fork of Muddlety Creek, 2.2 miles N. 26° E. of Hookersville; Stockton "A" (Upper Mercer) Coal; elevation, 2140' B.; observation by Price.

	Ft.	In.
Shale, with streaks of coal	2	0
Bone and shale	1	0
Coal, hard, bony	1	0
Concealed		

L. W. Herold Coal Prospect—No. 253 on Map II.

Hamilton District, on hillside east of Muddlety Creek, 0.4 mile N. 72° E. of Hookersville; Stockton "A" (Upper Mercer) Coal; elevation, 2090' B.

	Ft.	In.
Prospect closed, coal, reported by L. W. Herold.....	2	0

Wallace Hill Coal Mine—No. 254 on Map II.

Hamilton District, on hillside south of Muddlety Creek, 1.3 miles east of Hookersville; Stockton "A" (Upper Mercer) Coal; elevation, 2175' B.; observation by Price.

	Ft.	In.
Shale .....		..
Bone	0	3
Shale, soft	0	2

			Ft.	In.
Coal, soft	2'	0"		
Shale, soft, 0' 4" to.....	0	8		
Coal	0	1		
Shale	0	2		
Coal, soft, gas, dirty	0	7		
Shale, soft	0	1		
Coal, soft, gas.....	1	0		
Binder, reported 1' 0" to.....	2	0		
Coal, reported 1' 0" to.....	1	6	8	1
<hr/>				
Shale				

John Hill Coal Prospect—No. 255 on Map II.

Hamilton District, on hillside north of Muddlety Creek, 1.7 miles N. 67° E. of Hookersville; **Stockton "A"** (Upper Mercer) Coal; elevation, 2110' B.; observation by Price.

		Ft.	In.
Shale, fissile, black, roof			
Coal	4	0	

Farm Mine—No. 256 on Map II.

Hamilton District, on hillside south of Muddlety Creek, 0.7 mile west of Opal; **Stockton "A"** (Upper Mercer) Coal; elevation, 2125' B.; observation by Price.

		Ft.	In.
Coal fragments in slip above mine			
Coal, reported	2	6	

Coal Exposure—No. 257 on Map II.

Hamilton District, on hillside east of Clear Fork of Muddlety Creek, 2.2 miles N. 83° E. of Opal; **Stockton "A"** (Upper Mercer) Coal; elevation, 2078' L.; observation by Price.

		Ft.	In.
Shale, dark	8	0	
Coal	1	0	
Shale, dark			

Coal Exposure—No. 258 on Map II.

Hamilton District, in ravine on west side of Muddlety Creek, 2.4 miles S. 85° W. of Delphi; **Stockton "A"** (Upper Mercer) Coal; elevation, 2140' B.; observation by Price.

		Ft.	In.
Coal, in run	1	0	

Coal Blossom—No. 259 on Map II.

Hamilton District, on hillside west of Muddlety Creek, 0.6 mile

S. 33° W. of Hookersville; **Stockton "A" (Upper Mercer) Coal**; elevation, 2075' B.; observation by Price.

Coal and cannel shale at spring.

Coal Blossom—No. 260 on Map II.

Beaver District, on Little Beaver Creek near crest of hill, 0.7 mile north of Calvin; **Stockton "A" (Upper Mercer) Coal**; elevation, 2575' B.; observation by Price.

Coal, in tree roots, large amount, probably top of seam.

J. D. Lambert Farm Mine—No. 261 on Map II.

Beaver District, on hillside west of Back Fork of Beaver Creek, 1.6 miles S. 47° W. of Delphi; **Stockton "A" (Upper Mercer) Coal**; elevation, 2290' B.; observation by Price.

	Ft.	In.
Sandstone, shaly	10	0
Coal, reported 2' 6" to	3	0

J. D. Lambert Farm Mine—No. 262 on Map II.

Beaver District, on hillside east of Back Fork of Beaver Creek, 1.3 miles S. 30° W. of Delphi; **Stockton "A" (Upper Mercer) Coal**; elevation, 2270' B.; observation by Price; prospect closed.

	Ft.	In.
Shale, dark	3	0
Coal, reported	3	0
Shale		

R. A. Curry Farm Mine—No. 263 on Map II.

Beaver District, on hillside west of Beaver Creek, 0.8 mile S. 41° W. of Delphi; **Stockton "A" (Upper Mercer) Coal**; elevation, 2270' B.; observation by Price.

	Ft.	In.
Shale, gray, soft, with ferns		
Coal, medium-hard	0' 6"	
Shale	0	0½
Coal, medium-hard	0	3
Shale	0	1
Coal, medium-hard	1	5
Concealed		
		2 3½

KANAWHA BLACK FLINT.

The **Kanawha Black Flint** of Rogers⁴, later described more fully by White⁵, was named from its occurrence in the Great

⁴W. B. Rogers, Fifth Annual Report of Virginia; 1839.

⁵I. C. White, Bull. 65, U. S. Geol. Survey, p. 98; 1891; and Vol. II, W. Va. Geol. Survey, pp 328-331; 1903

Kanawha Valley of West Virginia, where it is a hard, black, flinty horizon, carrying marine fossils. This important member of the Kanawha Group crops extensively along the northern edge of Nicholas County, the main belt of its outcrop being eight or ten miles wide and approximately parallel to the northwestern border of the county. Southeast of this limit it is found only in isolated hilltops, and southeast of Summersville it is not found at all as its horizon is above the ridges. It has two distinct lithological phases, one of these being chert and the other shale. On the waters of Twentymile, Little Elk, and Buffalo Creeks, its typical appearance is that of an extremely hard, gray or black chert, the ledge often being five feet thick, and so far as observed, free from fossils. In this region it weathers into rectangular blocks of approximately square cross-section, one foot or more in length and from three to five inches on the shorter sides. Being very resistant to erosion, the rectangular shape and sharp angles of the blocks are preserved for an indefinite time.

On the waters of Birch River and Muddlety and Beaver Creeks the Flint loses its cherty character and is represented by black, fissile shale, often carrying an abundant marine fauna of typical Kanawha type, a detailed account of which will be given by Dr. Price in Chapter XIII.

Its stratigraphic position is immediately above the Stockton Coal and from 100 to 160 feet below the top of the Homewood Sandstone, its relationship being indicated in Chapter IV in the sections for Beech Fork of Lilly, Bintree, Dade, Greendale, Hardway Branch of Twentymile, Harriet (North), Harriet (South), Lockwood, and Payne Branch of Sycamore.

In **Jefferson District**, in addition to certain of the sections noted above, it was observed on the hillside east of Open Fork of Bells Creek, 1.5 miles southwest of Scotford, at an elevation of 1310' B.; on a private road 1.8 miles northeast of Dixie, at an elevation of 1330' B.; on Lilly Branch of Twentymile Creek, 2.2 miles southeast of Vaughan, at an elevation of 1615' B., and in a ravine entering Twentymile Creek from the north, at an elevation of 1530' B., this exposure being 5.3 miles northeast of Vaughan. At all of the above exposures the ledge is

flinty and hard, its thickness being about five feet when fully exposed.

In **Grant District**, it was noted on the hillside north of Twentymile Creek, 0.2 mile northeast of Harriet, at an elevation of 1600' B.; on the hillside south of Twentymile, 1.8 miles northeast of Harriet, at an elevation of 1610' B.; at the residence of Melvin Williams on the headwaters of Leatherwood Creek, 0.6 mile northwest of Harriet, at an elevation of 1515' B.; on the hillside south of Twentymile Creek, 0.9 mile southwest of Harriet, at an elevation of 1520' B.; on a branch of Robinson Fork of Twentymile Creek, 1.1 miles southeast of Harriet, at an elevation of 1715' B.; on the hillside north of Spruce Run, 1 mile southeast of Harriet, at an elevation of 1715' B.; on the west side of Jerry Fork of Peters Creek, 2.6 miles northwest of Zela, at an elevation of 1980' B.; on a private ridge road at the head of Jones Branch of Peters Creek, 1.9 miles northeast of Gilboa, at an elevation of 2005' B.; and in the head of Robinson Fork of Twentymile, 0.6 mile southwest of Lone Star School, at an elevation of 1825' B. At the above exposures it preserves its cherty phase, being about five feet thick.

In **Summersville District**, the Flint was noted on the south side of Libertyowl Branch of Beech Fork of Lilly Fork, 0.6 mile northeast of Dade, at an elevation of 1650' B., being a typical flint, two feet thick; and on the north side of the same stream, 0.7 mile northwest of Dade, where the debris from the ledge may be seen at an elevation of 1600' B.; also on Robinson Fork of Buffalo Creek, 1.8 miles northeast of Dade, where it is a black, hard flint, 5 feet thick, and having an elevation of 1580' B.; also on the road east of Jim Young Fork of Lilly Fork, 0.5 mile northeast of Dade, being 7 feet thick and having an elevation of 1640' B. Its shaly phase appears at an outcrop on the headwaters of Beech Fork of Lilly Fork, 1.1 miles southeast of Dade, where it is 3 feet thick and carries **Spirifer**, **Derbya**, and possibly other marine forms, its elevation being 1850' B., and its position just above an opening in the Stockton Coal. The flinty phase appears again on Beech Fork of Lilly, 1.2 miles southwest of Dade, where its outcroppings may be seen along the trail leading to Twentymile Creek, at an elevation of 1710' B.

In **Hamilton District**, it was observed on the west side of Ramp Run of Buffalo Creek, 2.9 miles southeast of Widen and 0.3 mile from the mouth of the run, at an elevation of 1470' B., being both flinty and fossiliferous, this outcrop being evidently near the border line between the cherty and shaly phases, its position being just above the Stockton Coal. On the waters of Muddlety Creek it is exposed just above a prospect in the Stockton Coal on Lower Spruce Run, 1.2 miles northwest of Hookersville, having a thickness of 1 foot and an elevation of 1893' B., and being a black shale with marine fossils. It was observed by Price on the north side of Paddy Run of the same stream, 0.3 mile northwest of Hookersville, having an elevation of 2006' B., and a thickness of 4 feet or more, and being black and shaly and carrying marine fossils; and again by the same authority on the east side of Muddlety Creek, 0.9 mile south of Hookersville, at an elevation of 2125' B., being shaly and carrying *Naiadites* fossils. On Birch River it was noted a few feet above drainage on the east side of the stream, 2.1 miles southeast of Wade, having an elevation of 1069' B., and being represented by 1' 6" of black shale with an abundant marine fauna, and coming just above an opening in the Stockton Coal.

In **Beaver District**, it was noted by Price on Back Fork of Beaver Creek, 1.4 miles southwest of Delphi, where it crops just above drainage, at an elevation of 2220' B., overlying a Stockton Coal stripping. Here it is a black, fissile shale, carrying an abundant marine fauna. In the extreme north end of the district it was observed on Barnet Run of Birch River, 1.9 miles southwest of Boggs, where, as has been previously described by the writer⁶, it occurs in the form of black and sandy shale, 5 feet thick, coming just above an exposure of the Stockton Coal, the elevation of which is 2070' B., many well-preserved fossils being noted.

The following paper, prepared independently by Dr. Price, gives a large amount of valuable information on the Kanawha Black Flint, as well as on other cherts of the State, and the accompanying figure outlines the restricted area in which the cherty phase of the Flint occurs:

⁶D. B. Reger, Webster Report, W. Va. Geol. Survey, p. 151; 1920.

CHERT DEPOSITS OF WEST VIRGINIA^{6a}.

By W. Armstrong Price.

That compact, siliceous rock, known as chert, or flint, is known in West Virginia to be associated with limestone or other calcareous or marine sediments of ten Paleozoic formations. The chert-bearing formations are shown in the following table, in which those formations of the geological "column" not known to contain chert are omitted⁷:

^{6a}The following discussion is largely a compilation of the work of others, the sources being indicated in the foot-notes. The writer has studied the Kanawha Black Flint in the field at a number of places while collecting marine fossils from it. He assumes responsibility for the lithologic description of the Kanawha Black Flint, with the two phases here described but first distinguished by others, as well as for the suggestions as to the origin of this deposit.

⁷For a complete list of formations to the top of the Mississippian System the reader is referred to the West Virginia Geological Survey, 1917, Report on Jefferson, Berkeley, and Morgan Counties, p 116, by G. P. Grimsley.

TABLE OF CHERT-BEARING FORMATIONS.

SERIES	FORMATIONS	CHERT DEPOSITS
PENNSYLVANIAN	Conemaugh Series	Chert, gray, nodular; in limestone.
	Pottsville Series	Chert, black; block and shaly phases.
MISSISSIPPIAN	Greenbrier Limestone	"Some dark chert." Silicified coral heads, common.
DEVONIAN	Oriskany Sandstone	Heavy beds; nodular, blocky.
	Helderberg Limestone (No chert reported)	Dark, blocky chert; weathers white. Road material.
SILURIAN ORDOVICIAN	Stones River Limestone	Cauliflower chalcidonic chert—great bed at base.
	Beekmantown Limestone	Yellow platy chert, below middle.
CAMBRIAN	Conococheague Limestone	Chert abundant at base, lava-like balls with pipes of vein-quartz.
	Elbrook Formation	Bright, yellow cherts.
	Waynesboro Formation	(Low ridges for fruit culture.)
	Tomstown Limestone	Upper beds have black-banded, chalcidonic chert in Maryland.

These will be discussed in three groups:—First, Cambrian, Ordovician, and Devonian; second, Mississippian; third, Pennsylvanian. Detailed descriptions of the chert beds of the first two groups are not attempted here. For this the reader is referred to the Reports cited herein.

CAMBRIAN, ORDOVICIAN AND DEVONIAN
CHERTS⁸.

The chert-bearing formations of the first group outcrop as longitudinal ribbons of varying widths paralleling the Ap-

⁸The information in regard to these cherts was obtained from the West Virginia Geological Survey, 1917, Report on Jefferson, Morgan, and Berkeley Counties, by G. P. Grimsley; from folios of the U. S. Geol. Survey by M. R. Campbell and N. H. Darton; and from the Maryland Geol. Survey, Lower Devonian Volume, 1913, by Charles Schuchert, C. K. Swartz and others, and from the Cambrian and Ordovician Volume, 1920, of the same organization, by R. S. Bassler.

palachian mountain ridges from the Shenandoah Valley, in the "Eastern Panhandle," on the north, through the eastern tier of counties along the Virginia State Line as far south as Pendleton County where they cross the line into Virginia. South of this county, formations of this group appear in only two areas in West Virginia: The Browns Mountain Anticline in Pocahontas County, which extends for a distance of approximately twenty-one miles from Greenbank southwestward to Rimel⁹, and which brings to the surface the Oriskany and Helberberg formations, and a zone along the southern borders of Monroe and Mercer Counties in which faulting and steeply dipping folds have brought a number of these formations, from the Cambrian to the Mississippian, to the surface.

The cherts are in many cases associated with siliceous zones in the limestone—for example, the "Cauliflower" chert bed at the Beekmantown-Stones River contact beneath highly siliceous and magnesian limestone. Marine fossils are in most cases abundant in the limestones, though sometimes rare; their calcareous shells are commonly replaced by the chert. Pseudomorphs of calcite crystals in chert are known from the Helderberg in at least one locality.

The cherts are white, bright yellow, light red or black; opaque to subtranslucent; dull, waxy, to subvitreous in lustre, some are banded and some approach chalcedony in appearance. They occur at lenticular masses; as blocks, plates or balls; compact, scoriaceous, lava-like or concretionary. Quartz druses, vein-quartz and thin seams of iron oxides are associated with the cherts.

Striking varieties are: Lava-like balls of the Conococheague chert penetrated by pipes of vein-quartz, with their surfaces discolored a dark gray, but white when broken; "Cauliflower" concretionary cherts of the Beekmantown; compact, sparkling, bright-yellow cherts of the Elbrook; black, banded chert of the Tomstown (in Maryland) which weathers into small blocky pieces as seen in residual soil from this formation. Yellow cherts similar to those of the Elbrook, but perhaps less compact, may have, upon disintegration, formed

⁹N. H. Darton, U. S. Geol. Survey, 1898, Monterey Folio, p. 6, ("the anticlinal uplift of the Browns Mountain range").

the yellow tripolite of the Waynesboro. These varieties may be used as guides in identifying outcrops of the chert-bearing formations.

Apple trees and berry bushes are said to grow especially well on the ridges formed by the chert outcrops. The soil, though thin or nearly absent at the surface, is said to be porous, with good air circulation and drainage and to impart a fine flavor to the fruit.

The chert is in some places used for surfacing roads. In general, it is durable but does not cement into a firm bed. Some beds are said to have fair cementing qualities when the chert is crushed and laid on the road, and others give a smooth, cemented road-surface if mixed with limestone. Large quantities of blocky fragments of chert of sizes suitable for use on roads, with little preparation needed, can be obtained from the rocky ridges along the outcrops of some of the chert-bearing beds.

MISSISSIPPIAN CHERTS.

In the southeastern counties of West Virginia, where the Greenbrier Limestone is thickest, the basal portion has been described¹⁰ as being heavy-bedded and containing "some black chert". Silicified corals and other silicified fossils are found in the limestone in this region. Northward, toward the Maryland and Pennsylvania State Lines, the limestone is greatly reduced in thickness and chert is absent. Silicified fossils have not been reported in this area.

PENNSYLVANIAN CHERTS.

The Kanawha Black Flint, the next chert deposit in order of stratigraphic succession, will be discussed later.

"HUGHES RIVER FLINT" OF THE BRUSH CREEK LIMESTONE.

The Brush Creek Limestone of the lower Conemaugh Series is generally a dark, argillaceous, highly fossiliferous limestone associated with thicker beds of fossiliferous shale.

¹⁰M. R. Campbell, U. S. Geological Survey, 1896, Pocahontas Folio.

The lime-content has frequently been leached out, leaving numerous fossil cavities. Where the Volcano-Burning Springs Anticline, in Wood, Wirt, and Ritchie Counties, has brought this formation to the surface, there appears in it a bed of light-gray or reddish chert, locally known as the "Hughes River Flint"¹¹.

Many weathered fragments are bleached to a dead white, and some have become porous. Below drainage the chert is reported in the log of an oil well drilled on Hughes River about two-fifths of a mile from the outcrop. Dips of forty-five degrees are recorded on the western limb of the anticline very near this point. The ledge of chert is from five to fifteen feet thick and lies immediately below the massive Buffalo Sandstone, and rests upon the fossiliferous shale, the limestone being absent at most places where the chert is reported. An analysis of this chert is given on a later page.

This chert was used by the Indians in the manufacture of arrow-heads, spear-heads, and other weapons and implements, which have been scattered over many counties, and appears to have furnished most of the "flint" for the arrow-heads found in the northern counties of the State. Within the area of outcrop of the Kanawha Black Flint, to be described on a later page, arrow-heads were made from its purer ledges. To the east, in Nicholas County, at a distance from the outcrop of the ledge of about twenty miles, arrow-heads and chert spalls were found in large quantities with a few of the larger boulders from which the spalls were broken. Even in the northern counties black arrow-heads are found, but some, at least, of these probably came from the chert deposits of Flint Ridge in Licking and Muskingum Counties, Ohio, where quarrying operations in the chert ledges were carried on by the Indians¹².

CHERT AT ANDERSON, PRESTON COUNTY.

At one other locality, Anderson, in Preston County, on the

¹¹White, I. C., 1903, West Virginia Geological Survey, Vol. II, p. 331. Hennen, Ray V., 1911, West Virginia Geological Survey Report, Wirt, Roane, and Calhoun Counties, p. 258.

¹²Mark, C. G., 1911, Bull. Dennison Univ., Sci. Lab., vol. xvi; p. 276. This deposit is supposed by Miss Mark to be probably at the horizon of the Putnam Hill (Allegheny) Limestone.

rim of the Kingwood Syncline, chert is reported at the Brush Creek horizon¹³. This chert is said to have a shaly structure.

THE KANAWHA BLACK FLINT.

DESCRIPTION OF THE DEPOSIT.

The Kanawha Black Flint¹⁴ was first described by W. B. Rogers in 1839 as "The Black Flint," "a band of black, or bluish-black, siliceous rock approaching the character of a flint or hornstone." I. C. White later called it the Kanawha Black Flint.

The massive Homewood Sandstone forms the top of the Kanawha Group of the Pottsville Series. Beneath this is a shale unit, varying in thickness from 0 to 35 feet, usually carbonaceous, frequently containing plant remains or marine fossils, and overlying the Stockton Coal. In this shale unit, and occupying a relatively variable position with regard to the amount and proportion of shale above and below, lies—in the area designated—the Kanawha Black Flint ledge. This ledge, with its resistant outcrop and residual blocks scattered over hill slopes and along valley bottoms, forms a conspicuous feature of the Kanawha Valley east of Charleston and, where present, has long been used as a "key rock" from which to determine the location of coal beds above and below its horizon^{14a}.

The shale unit in which the chert or "flint" is found outcrops in a broad band across West Virginia from Mingo County in the south, where it crosses into Kentucky, to

¹³Reger, D. B., personal communication. White, I. C., West Virginia Geological Survey, 1903, Vol. II, p. 331.

¹⁴The data for the description of this formation have been obtained from a variety of sources. I. C. White is quoted from Bull. 65, U. S. Geol. Surv., and from Vol. II, West Virginia Geol. Surv.; M. R. Campbell in the U. S. Geol. Surv., Charleston Folio, has given an excellent description of the chert in the area of the folio; county reports of the West Virginia Geol. Surv., by Hennen, Reger and Krebs, assisted by Teets, Tucker, and Price, have supplied much of the data. The writer's field investigations of this stratum have been made at scattered points while collecting fossils and have extended over a number of years; he has not made a systematic investigation of the flint throughout the area of its outcrop.

^{14a}This bed was chosen by Rogers, in "The Geology of the Virginias," 1839, p. 346, as the boundary between his "Upper Coal Series" and "Lower Coal Series."

Upshur County in the north, where it is lost in the gradual thinning of the Pottsville measures. Its position in the thin Pottsville of Barbour and Preston Counties has not been definitely determined.

The chert which is less extensive than its enclosing shale, occupies approximately the middle third of the length of the shale band and crosses its entire width, except in northern Nicholas. It outcrops over a pentagonal area in Kanawha, Fayette, Clay, and Nicholas Counties, which measures 60 miles in a northeasterly direction and 24 miles in a southeasterly direction. The city of Charleston is situated at the westernmost corner of the pentagon. The boundaries of the chert within the areas of the several counties are described in detail in the county reports of the West Virginia Geological Survey for Kanawha, Clay, and Fayette Counties and in the present Report on Nicholas County. The approximate areal limits of the chert deposits, above and below drainage, are shown in Figure 3.

The chert has been cut through and eroded along the valleys of the rivers and streams. The dip of the ledge is northwest, averaging 25 feet to the mile, but locally as high as 78 feet per mile where involved in the anticlinal folds which interrupt the general monoclinical structure of the region. Within the area, wells and borings have established the general continuity of the chert under the hills between outcrops and in the bottoms of synclines. Where it passes below drainage at the western border of the area it has been noted by the drillers only at shallow depths. On the eastern border its horizon passes into the air in Fayette County, the chert having been removed in the erosion of the Allegheny Plateau surface. In Nicholas its eastward extension passes somewhat abruptly into a soft, fossiliferous shale. The change takes place, along a portion of the line between the two phases, between the western and eastern slopes of Powell Mountain in a distance of one and one-half miles.



Figure 3.—Showing Approximate Boundary of the Chert Deposits of the Kanawha Black Flint Horizon. Beyond the area enclosed by the heavy line the chert disappears, having been removed by erosion or its place having been taken by shaly sediments.

The ledge varies from one to ten feet in thickness. Two distinct phases of the chert may be recognized. The first is a denser, more vitreous and compact variety. On weathering, rectangular blocks separate from the ledge, elongate parallel to the bedding, up to five or six feet in length. In the present stream beds these have resisted attrition and are only slightly rounded at the edges, but on stream terraces above the flood-plains rounded chert gravel is found. The surface does not acquire a polish by stream transportation. In the rock "core" obtained from a diamond-drill test-hole the chert acquires a good polish. This will be spoken of the "block phase." In color it is coal-black, to blue-black, to gray, in some specimens indistinctly banded; slowly weathering superficially to a grayish-white; lustre dull, slightly vitreous, in some specimens translucent on thin edges, when rounded masses of black, opaque material are to be seen in the cloudy matrix. Hard; brittle; fracture conchoidal; masses weakened by fracture lines with iron oxide coatings. Compact, minute, even-grained—as seen on smooth surfaces under a high magnification—with slightly larger grains of black, vitreous silica in a duller ground-mass. When found in the boulder deposits of the elevated terraces along the valley of the Great Kanawha River the chert boulders are usually bleached by prolonged weathering to a depth of an inch or more and are white in color with a creamy tinge in some specimens.

The second phase is only slightly less compact than that just described; on weathering, a shaly structure results, the chert being broken into thin plates parallel to the bedding and much resembling slate, but with a wavy splitting surface which is frequently washed with a red coating of iron oxide. This will be designated the "shaly phase." It has a dull lustre, breaks with a more irregular fracture and bears little resemblance to the purer varieties of chert. The shaly habit of this type of chert may be attributed to its higher content of alumina. It is found, in places, above and below the massive "block phase" ledges but in other localities is the only phase present. The color of the chert is probably due to the presence of the carbonaceous matter shown in the table of analyses below, and disappears slowly on heating.

Within the area of outcrop these two phases appear to have an irregular disposition and intermediate gradations exist.

A description of the chert given by Campbell and Mendenhall¹⁵ recognizes two types, one of which is described as being in massive beds, 20 to 30 inches thick and breaking into rectangular blocks—our block phase—and the other as “sharp, flinty shale”—our shaly phase—“which [latter] represents a transition from the flint to sandy shales.” This description throws much light on the relationship of the two phases of the chert and is, in part, as follows :

“In its best development it is about 10 feet in thickness, with usually a few feet of accompanying sharp, flinty shale, which represents a transition from the flint to sandy shales above and below. Occasionally, however, it is immediately overlain by coarse sandstone, the change in such a case being very abrupt. Where the flint is heavy it is usually divided by well-marked bedding-planes into three or four subordinate strata, 20 or 30 inches in thickness, which within themselves exhibit no traces of bedding, but break into almost indestructible blocks rudely rectangular in shape and of all sizes up to 5 or 6 feet in length. These cover the slopes below the outcrop and form by far the most prominent part of the talus.

“From the region of maximum development about the headwaters of Kellys Creek it fades toward its margin by reduction in absolute thickness, by increase in bedding-planes and fissility, and by becoming coarser in grain and more sandy in texture, until it is impossible to distinguish it from the usual Coal Measures shales. It also appears to be absent from the section entirely at places where its horizon is present, since climbs occasionally fail to reveal any trace of it.”

The Kanawha Black Flint is one of the most persistently and prominently fossiliferous of the 15 or more horizons in the Pottsville of the State which are known to contain invertebrate remains. The purer ledges of the “block phase” have yielded fewer fossils than the more shaly portions of the bed. In some localities the “block phase” has been reported as being unfossiliferous. In the chert and in the shale which appears at the same horizon beyond the chert area are found cavities left by the leaching of calcareous fossil shells. A few calcareous shells have been found in the chert but they appear to have lost much of their original material without,

¹⁵U. S. Geol. Surv., 1896, 17th Ann. Rept., Pt. II, “Geologic Section Along New and Kanawha Rivers in West Virginia,” p. 507 (and pl. xxxviii).

however, appearing porous or excessively exfoliated. Chitinous shells remain, apparently unaltered. Shells and cavities in the shaly phase have been flattened in all collections which have come to hand. At the outcrop of the shale the shells have, in many cases, been leached out, only the casts remaining; in other cases, the shells remain and are more or less completely preserved. **Spirifer, Derbya, Chonetes, Productus, Lingula, and Orbiculoidea** are the common brachiopod genera present; chaetopoda have been found and, in some places, pelecypoda are common. The fauna of these Pottsville horizons is not yet known in sufficient completeness to enable us to distinguish surely one of the more prominent fossil beds from the others by faunal means alone^{15a}.

The following chemical analyses made in the laboratory of the West Virginia Geological Survey are illustrative of some types of sediments from this horizon. The first three specimens analyzed were chosen by the writer as representing three typical deposits from the horizon of the Kanawha Black Flint; with these is given an analysis of the chert of the Brush Creek Limestone:

ANALYSES OF CHERT AND ASSOCIATED ROCKS.

	1.	2.	3.	4.	5.
SiO ₂ insol.	91.31	79.73	78.47	83.09	87.20
SiO ₂ sol.	1.55	0.86	1.03		
Fe ₂ O ₃	2.28	1.83	5.62	4.40	0.28
FeO					
Al ₂ O ₃	1.95	8.29	6.77	6.94	2.80
CaO	0.27	0.70	1.01	0.53	3.88
MgO	0.10	0.34	0.32	0.76	0.78
K ₂ O	0.77	1.82	1.67	1.44	0.40
Na ₂ O				0.54	0.16
TiO ₂				0.33	
P ₂ O ₅				0.36	
Moisture	0.23	0.53	0.50	0.31	
Ignition loss ..	2.03	6.55	4.84	2.10	4.40
Total	100.49	100.65	100.23	100.80	99.90

^{15a}For faunal lists see: West Virginia Geol. Survey, 1916, Report, Raleigh and Western Portion of Mercer and Summers Counties, pp. 678 and 679.

1. "Block phase," Kanawha Black Flint, Twentymile Creek, at Belva, Nicholas County, stream gravel deposit; magnetic. 2. "Shaly phase," Kanawha Black Flint, outcrop, mouth of Ramp Run of Buffalo Creek, Nicholas County. 3. Fossiliferous sandy shale, much leached, outcrop of Kanawha Black Flint horizon, Gladly Creek, 1 mile north of Bablin, Lewis County, quarry in shale. 4. Unrecorded phase ("flint") of Kanawha Black Flint, Joseph Conner's field, Davis Creek, 3 miles east of Chilton, Kanawha County, outcrop; West Virginia Geol. Surv., Rept., 1914, Kanawha County, p. 265. 5. Chert of Brush Creek Limestone, mouth of Ellison Run of Goose Creek, Wirt County, outcrop, dip 45 degrees; West Virginia Geol. Surv., Rept., 1911, Wirt, Roane and Calhoun Counties, p. 259; (chert replacement of limestone?) Note: "Silica soluble" is silica dissolved by 250 cc. 10th. normal solution sodium carbonate, containing 5.3 grams of sodium carbonate per litre; time of boiling, 20 minutes. Ignition loss is interpreted as carbonaceous matter and combined water. [Analyses of Nos. 1, 2 and 3, by J. B. Krak, Assistant Chemist, West Virginia Geological Survey.]

THEORIES AS TO CHERT ORIGIN.

The theories of the formation of chert which have been advanced by writers have been briefly summarized and reviewed by Tarr¹⁶ who concludes that they may be grouped under the following heads:

1. Chert is the result of direct chemical precipitation [on the sea bottom.]
2. Chert is the result of the secretion of silica by organisms.
3. It is the result of the replacement of calcareous material.
4. It is of organic origin but not through replacement.
5. It is a spring deposit.
6. It is a mechanical sediment.
7. It is regarded as being due to weathering."

In discussing the first three of these modes of origin, Tarr says:

"The theory that chert originated through the precipitation of silica in the colloidal form upon the sea bottom was advanced by Prestwich in 1888. The silica was thought to have accumulated about the siliceous spicules of sponges, which acted as nuclei, or in the absence of such material, decaying organic matter might also have acted in the same capacity. Once started, the aggregate would, according to the theory, continue to attract silica to itself from the surrounding muds as long as material was available. . . .

"The advocates of the theory that silica was first segregated by some organism have presented much evidence in its support. The main evidence is the finding of the remains of sponges and diatoms scattered throughout the chert. . . . This theory . . . is largely

¹⁶Tarr, W. A., American Jour. Sci., 1917, Vol XLIV [Whole No. CXCIV], pp. 409-451, The Origin of the Chert in the Burlington Limestone.



PLATE IX (a).—Characteristic blocks weathered from ledges of the "block phase" of the Kanawha Black Flint. From gravel deposits in bed of Twentymile Creek, near Belva, Nicholas County.

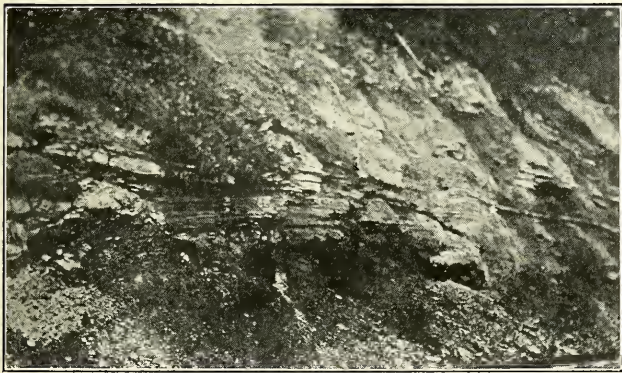


PLATE IX (b).—Outcrop of the Kanawha Black Flint ledge in C. & O. R. R. cut, 0.6 mile east of the C. & O. R. R. station, Charleston, Kanawha County. (From Kanawha County Report).

accepted by American geologists as is shown by the statements made in all our latest text-books. Had these early investigations been made on material collected in Missouri, very likely a different theory would have resulted, because Missouri chert shows no remains of siliceous organisms.

"The advocates of the theory that the chert and flint nodules and beds are the result of the replacement of calcareous material of the limestone early called attention to the fact that fossils known to be originally calcareous were often found silicified undoubtedly through replacement. A. H. Church was able to replace with silica the calcium carbonate of fragments of coral by allowing a weak solution of colloidal silica to percolate over it. On account of the finding of fossils on the interior of the chert and flint nodules which were originally calcareous, the conclusion was drawn that the silica had replaced the fossil and that the nodule had grown by further additions on the outside, each particle of silica replacing an equivalent amount of calcareous material. The presence of siliceous spicules of sponges in chert and flint suggested a possible source of the silica in the nodules, and since the silica in the spicules is in a form regarded as being soluble in ground water, it was thought to have been taken into solution and deposited about other sponge spicules which acted as nuclei. Other silica-secreting organisms, such as radiolaria, have been suggested as possible sources of the silica. In this and the preceding theory the organisms were thought to have obtained their silica either from the sea water in which it was held in solution or by decomposing silicates occurring in the muds upon the bottom. There seems to be room for doubting that the latter method is an important mode for obtaining the silica, for the silicates which accumulate in the muds have already withstood the attacks of solutions upon the earth's surface and are very stable. Most of the men who held the view given above believe that the segregation of silica by organisms was followed by its solution, removal, and deposition elsewhere, so that these two theories are really no more than one.

"That the chert layers and nodules may have been due to the accumulation of abundant organic remains upon the sea bottom was an idea advanced by Wallich and has been favored by others. The possibility that a part of the silica was a chemical precipitate derived from soluble sponge spicules was also included in this theory, but the method of precipitation was not explained.

"Lawson has suggested the theory that the chert of the Franciscan series in California is due to the precipitation of colloidal silica brought to the sea water by thermal springs. The chert contains sponge spicules, and Lawson states that these probably fell into the soft colloidal silica on the sea bottom and were preserved.

"An unusual mode of origin was suggested by Penrose and Buckley, who thought that the silica might be transported to its present position as a fine siliceous mud. Penrose applies his theory to the Boone chert in northern Arkansas and Buckley to the dark-colored, secondary chert in the Joplin district of southwestern Missouri. It is difficult to explain the source of such a siliceous mud.

"Another theory that has been suggested to explain the origin of chert is that the aggregation of the silica is due to the ordinary process of weathering. It is thought by Ulrich, who suggested this view, that the silica, being insoluble, is concentrated near the surface as the associated calcareous material is removed by subaerial erosion. This view is held by some others, but the finding of chert in the lower formations in some of the deepest wells that have been drilled in

Missouri is strong evidence against it. Further, a careful study of the occurrence of the chert in the area described by Ulrich shows that it does not have unequal distribution, though Ulrich reported that it did and interpreted the condition as indicating superficial concentration by weathering.

"It is evident from the above brief statements that while there are several views as to the origin of chert, the important ones are the first three given, which should really be regarded as two. The theory which seems to be prevalent at the present time, judging by the recent text-books of geology, is that the silica was originally secreted by organisms and then aggregated into the nodular or bedded form through replacement of the limestone by circulating ground waters, either before or after the consolidation of the limestone. The supporters of the theory that chert is due to chemical precipitation assume that the silica was in the sea water, and that it has been precipitated by some means or other, which they fail to suggest."^{17a}

ORIGIN OF THE KANAWHA BLACK FLINT.

It is believed that no single mode of origin should be invoked to explain the formation of all chert deposits and that each occurrence must be viewed in the light of its stratigraphic, mineralogic, chemical, biological and regional relations. The following discussion of the origin of the chert deposit known as the Kanawha Black Flint is partly tentative in that it does not fully take into account each of the factors enumerated.

VIEWS PREVIOUSLY ADVANCED.

1. Two of the three theories of origin considered by Tarr to be the most important have been invoked by I. C. White to explain the origin of the Kanawha Black Flint. The marine nature of the deposit and the presence in it of brachiopod remains at first led him to suggest that the flint was derived from the remains of diatoms and protozoa^{17b}, although such remains were not known in the chert.

2. Later he writes^{17c}:

"This fact, [the presence in it of the shells of marine invertebrates], has an important bearing upon the origin of the flint deposit, whether it is an original accumulation of siliceous matter like the flint in chalk, from the siliceous skeletons of diatoms and other minute forms of life, or whether the silica is derived by solution from the

^{17a}Tarr, loc. cit., pp. 411-413.

^{17b}U. S. Geol. Survey, 1891, Bull. 65, p. 98.

^{17c}West Virginia Geological Survey, 1903, Vol. II, p. 329.

overlying sandstones, and has invaded this horizon from above by a kind of chemical replacement. The latter theory appears the more plausible from the facts already at hand, although it is possible that both agencies may have operated to produce the flint in question."

The nature of this postulated replacement was not discussed and no facts in support of a replacement hypothesis were adduced.

3. Following I. C. White, Price^{17d}, was inclined to favor the conception of an origin through the deposition of silica by descending surface waters, but found that there was no evidence for the replacement of calcium carbonate in the rock by this silica. He advanced the view that the silica was deposited "in the pores of a carbonaceous and highly siliceous rock" resulting "in the formation of a dull, black, compact chert or flint." To continue: "Absence of original siliceous ooze is inferred but not proven. Tilting of the strata has enabled solutions to migrate along the dip, increasing silicification."

The mutual relation of the two phases of the chert has been discussed by Campbell and Mendenhall¹⁵ who concluded that the "sharp, flinty shale"—our shaly phase—"represents a transition from the flint to sandy shales" both above and below the finer chert ledges and also laterally across the borders of the area. The writer agrees with this very obvious explanation.

OBJECTIONS TO THESE VIEWS.

1. Although fairly abundant remains of brachiopods with occasional tests of a *Conularia* and a single chaetopod test have been found in the Black Flint no organisms which possessed siliceous parts are known in it, at least in this immediate region. Since no microscopic examination of the chert by transmitted light has been made by the writer or has been reported by others, the absence of microscopic siliceous tests or sponge-spicules can not be affirmed. In the fossiliferous shales which appear at this horizon beyond the chert area a

^{17d}W. Armstrong Price, 1918, [Abstract] *Science*, N. S. Vol. XLVII, No. 1219, pp. 468-469, "The Kanawha Black Flint and other cherts of West Virginia."

search of material from several localities has failed to reveal such a microscopic fauna; at this horizon in Webster County, however, numerous shells show root-like borings which have been referred to **Clionolithes** and which are supposed to be the result of the boring of sponges of the family Clionidae, the modern representatives of which secrete pin-shaped siliceous elements which are encased in horny fibers and by means of which the sponges bore into the shells of molluscs. This sponge, if it be indeed a sponge, is not known to have inhabited the chert area. The work of this boring organism nowhere at this horizon appears to have been conspicuous enough to lead us to suppose that it was present in sufficient numbers for its remains to have contributed an appreciable portion of the silica of the Kanawha Black Flint.

Against the possibility of the invasion of the horizon by silica-rich waters resulting in the replacement of a soluble material by silica or the infiltration and cementation of a porous, sandy shale to form a continuous bed of chert there are a number of very strong objections.

These may be summarized as follows:

1. Absence of silicification of fossil shells in the chert.
2. Partial preservation, in some cases, of calcareous shells without replacement.^{17e}
3. Persistence of cavities left by solution of calcareous shells, without filling by amorphous silica or by the formation of quartz druses or other siliceous deposits^{17e}
4. Absence of limestone or other soluble deposits at this horizon in West Virginia and the insignificant amounts of calcareous material in the fossiliferous shales. The shells themselves account for the larger amount of the lime-content of the shale.
5. Absence of flint in other areas in West Virginia where thick sandstone beds overlie argillaceous and siliceous fossiliferous shales of the Pennsylvanian System.
6. Occurrence of normal, impervious, argillaceous shales between the Kanawha Black Flint and the overlying sandstone without evidence of secondary silicification in the shale.
7. Horizontally banded structure and translucence of

^{17e}Insufficient field study has been given to the occurrence of the fossils in the chert to warrant an explanation of the disappearance of the lime of the shells; nor can it be confidently asserted that silicification of fossil shells has in no case taken place.

thin edges not easily explained on the basis of downward replacement or infiltration from above.

8. Apparently general absence of secondary silicification at this horizon in West Virginia and in this area, both in the shales and in the sandstones.
9. Apparent absence of drusy cavities and residual masses of the rocks supposed to have been replaced, both of which are characteristic of replacement deposits.

There seem to be no facts which would recommend in the case of the Kanawha Black Flint an origin by deposition of silica from hot springs. The bedded nature of the chert and the gradation, laterally and vertically, through a shaly variety into a true shale seems to preclude such a method. Nor can such a deposit have originated by the residual concentration of a cherty limestone.

The suggestion of Penrose and Buckley that chert may have been formed by the transportation and deposition of a fine siliceous mud would explain the known physical structure of the Kanawha Black Flint bed, but since, as pointed out by Tarr, we do not know how such a mud could have been produced we are not in a position to invoke this mode of origin for chert deposits. The lenticular nature of the bed, the gradual passage from compact chert, through shaly chert to shale, the absence of sharp contacts between the chert and the enclosing rocks and the general absence of secondary silicification seem to point to the chert as a primary, bedded, marine deposit formed contemporaneously with the enclosing beds and not essentially altered since its consolidation.

ORIGIN BY DIRECT CHEMICAL PRECIPITATION IN SEA WATER.

The mode of formation of the bed may have been by direct chemical precipitation in the basin of deposition after the manner postulated by Tarr for the origin of the chert in the Burlington Limestone. Tarr's conclusions are:

"The silica is believed to have been derived from the land by chemical weathering and transported to the sea by the streams as colloidal silica. Areas of low-lying lands, especially peneplaned areas, where chemical denudation predominates over mechanical, would be especially favorable for furnishing increased quantities of silica. Wide areas of igneous and metamorphic rocks would also be very favorable for furnishing colloidal silica, as large amounts of silica are liberated by the decay of such rocks. Present streams are transporting large

amounts of silica to the sea, and under such conditions as peneplanation, especially on areas of igneous rocks, the amount of silica would be greatly increased. The theory advanced, however, is not dependent upon a peneplaned area as the source of the silica. The main idea is that silica was precipitated directly on the sea bottom after it had been brought to the sea by streams, . . . The colloidal silica is believed to have been precipitated in the sea water after it had undergone considerable dispersion, and a certain amount of concentration."¹⁸

It is well known that the present streams are transporting large amounts of dissolved silica to the ocean and there is no reason for believing that those flowing into the basin of deposition of the Kanawha Black Flint did not also carry large amounts. The sediments of the Pottsville Series in this area are notably siliceous, indicating that the streams were flowing over highly siliceous rocks, and when the grade was great enough and the currents swift enough, large amounts of siliceous sediments must have been transported mechanically resulting in the formation of the sandy and siliceous sediments of this region. It is, therefore, reasonable to expect that substantial amounts of dissolved silica were also transported.

The chert bed lies in the midst of a shale unit and above a coal, hence it was formed during an interval of sluggish streams when chemical denudation would be expected to be increased. That the chert was deposited in saline water during a period of incursion of the sea is indicated, not only by the work of Tarr as applied on theoretical grounds to this bed, but also by the wide-spread occurrence of marine fossils in both chert and shale at this horizon.

The enclosing sediments, the shale, and the coal and sandstone, are non-marine in origin, hence the deposition of the chert with its marine fossils indicates only a temporary incursion of marine waters, which was preceded and followed by non-marine deposition.

The colloidal silica carried in solution by streams has been shown experimentally by Tarr to be readily coagulated by sea water. Upon entering the marine basin of deposition the silica would be coagulated. If there were present in the water considerable clayey material the colloidal silica would be coagulated by the sea water and carried down by the sink-

¹⁸Tarr, *op. cit.*, p. 427.

ing clays and silts because of the tendency of the gel to adhere to the fine silts. As the waters became cleared of clay and silt, purer and purer silica would be deposited. If the waters were quiet, this silica, according to Tarr's experiments, would coagulate near the shore in spherical masses which when distributed through an accumulation of lime mud would form oval nodules of silica upon later consolidation. If, however, gentle currents were active, the silica would be widely distributed, and in the absence of deposition of lime mud or silt, or in the presence of an excessive amount of silica, a continuous bed of chert would be produced.

It was also found in Tarr's experiments that "the silica is probably not precipitated immediately [by sea water] but accumulates in the form of the colloid until it is of sufficiently high concentration to be coagulated." This may explain the banding of the chert.

The black color of the chert is readily explained by the presence in the waters of finely divided carbonaceous silt which was carried down by the silica.

Tarr postulates the ultimate formation of chert from the colloidal silica by consolidation "through pressure, loss of water, and crystallization."

The scarcity of chert deposits throughout the great thickness of Pennsylvanian rocks in this region is probably due to the non-marine nature of the strata^{18a}, and the large amount of aluminous and carbonaceous silt which appears to have been commonly carried by the streams when the currents were reduced. That the conclusions set forth in this discussion of the origin of the Kanawha Black Flint may have to be revised when the micro-structure of the chert shall have been determined, is recognized.

That the conditions which permitted the deposition of the siliceous ooze of the Kanawha Black Flint were not confined to West Virginia, is shown by the occurrence of chert at Flint Ridge, Ohio, and at other points in that State in sediments formed during this part of Pennsylvanian time^{18b}. A

^{18a}The total thickness of the known marine deposits of the Pennsylvanian System in West Virginia forms a very small percentage of the total thickness of the strata of the System.

^{18b}Lower Allegheny and upper Pottsville, in Ohio.

flint ledge in western Kentucky which may be at approximately the same stratigraphic position as the Kanawha Black Flint is reported by Krebs^{18c}.

SUMMARY OF CONCLUSIONS AS TO ORIGIN OF THE KANAWHA BLACK FLINT.

The chert is a marine deposit formed contemporaneously with the enclosing non-marine strata.

It is not of secondary origin, and was not formed by chemical replacement of a soluble material before or after being covered by the overlying beds, nor by silicification of a porous material by descending solutions.

The presence of siliceous organic remains in the chert is not known but their absence can not be affirmed since no microscopic examination of thin sections of the rock has been made. Organisms bearing siliceous skeletal elements are not known in appreciable numbers in the fossiliferous deposits at this horizon in West Virginia.

The chert was probably formed by the coagulation and precipitation of colloidal silica brought down by streams into the sea. The sea brine acted as an electrolyte in causing the coagulation.

The shaly phase of the chert owes its lithologic structure to a content of approximately 8 per cent. of alumina, or 6 per cent. more than that present in the purer, block phase.

STOCKTON (LOWER MERCER) COAL.

The **Stockton Coal** of White¹⁹, named from Aaron Stockton who once mined it at the town of Cannelton, Kanawha County, belonging just under the Kanawha Black Flint and 110 to 170 feet below the top of the Homewood Sandstone, is usually present in northern Nicholas where its horizon outcrops, being multiple-bedded, with both splinty and soft or gaseous layers, interstratified with partings of dark shale or slate, its thickness varying from 1 to 5 feet. As previously stated by the writer²⁰, the Stockton quite evidently correlates

^{18c}Krebs, C. E., written communication.

¹⁹I. C. White, Vol. II, W. Va. Geol. Survey, p. 583; 1903.

²⁰D. B. Reger, Barbour, Upshur, and Western Portion of Randolph Report, W. Va. Geol. Survey, pp. 271 and 662; 1918.



PLATE X (a).— Upper figure, "Cauliflower Chert" marking the top of the Beekmantown Limestone; from near Martinsburg, Berkeley County; Lower figure, Scoriaceous chert characteristic of the lower part of the Conococheague Limestone; from near Shepherdstown, Jefferson County.



PLATE X(b). —A slab of the shaly phase of the Kanawha Black Flint, with the flattened, chitinous shell of *Conularia crustula*? From Queen Shoals Creek, at the town of Queen Shoals, Kanawha County.
(From the Kanawha County Report).

with the **Lower Mercer** of the Pennsylvania classification, since the Kanawha Black Flint fossils just above it have been traced as far northeastward as southern Upshur County, from which region northward its correlation with the Pennsylvania members is not subject to serious doubt.

As a commercial coal the Stockton (Lower Mercer) is much more poorly developed in Nicholas than in Webster, on the east, or Fayette, Kanawha and other counties on the west, and owing to its slate partings suffers much in comparison to other seams of the Kanawha Series. It will eventually supply a limited amount of mining acreage, however, and its character and areal extent, together with detailed bed-sections, will therefore be presented in Chapter X, under the subject of "Commercial Coal."

UPPER COALBURG (UPPER CONNOQUENESSING?) SANDSTONE.

The Coalburg Sandstone of White²¹, later termed the **Upper Coalburg Sandstone** by Hennen and the writer²², coming a few feet under the Stockton Coal, is present generally throughout northern Nicholas where its horizon occurs, being gray, massive, medium-coarse and hard, and from 20 to 40 feet thick, sometimes developing heavier lenses. In Chapter IV its presence and character are noted in the sections for Anthony Creek (Mouth), Bintree, Birch River, Gilboa, Hardway Branch of Twentymile Creek, Harriet (North), Hookersville, Lockwood, Muddlety, Mudlick Run of Anthony Creek, Panther Mountain, Shant Branch of Powell Creek, and Skyles.

For reasons fully explained in a previous Report²³, it is the belief of the writer that the Upper Coalburg Sandstone is the same as the **Upper Connoquenessing** of the Pennsylvania classification, having been first named and described by Dr. I. C. White from its occurrence in Lawrence County, Pennsylvania. Its transition from a great pebbly conglomerate in northern West Virginia to a smooth-grained ledge of much less prominent proportions in Webster and Nicholas has been

²¹I. C. White, Vol II(A), W. Va. Geol. Survey, p. 468; 1908.

²²Hennen and Reger, Logan and Mingo Report, W. Va. Geol. Survey, pp. 137-138; 1914.

²³D. B. Reger, Webster Report, W. Va. Geol. Survey, p. 152; 1920.

carefully traced across several counties by the writer, leading to the belief stated above.

So far as known it has not been quarried in the county but at points of convenient access it could be profitably used for structures where massive and durable masonry is desired. Its position at any point may be readily determined from the Coalburg Coal, above which it comes by an interval of only a few feet, the outcrop of that seam being delineated on Map II.

COALBURG "A" COAL.

The Coalburg "A" Coal, not previously described or named, is apparently a thin and lenticular seam that makes its appearance in the western part of Nicholas County. As noted in the section for Swiss, page 115, at **Coal Exposure No. 312 on Map II**, its position is recorded as coming 40 feet below the Stockton Coal and 40 feet above the base of the Coalburg Coal. As neither the Stockton nor Coalburg is subject to doubt in that section the intermediate exposure clearly represents an intermediate seam and it will be called the **Coalburg "A."** At this exposure, which is located on the hillside north of Gauley River, 1.1 miles westward from Swiss, Jefferson District, at an elevation of 1530' B., the cross-section of the coal was not exposed and its character is unknown. At **Coal Prospect No. 313 on Map II**, located on the south side of Twentymile Creek, 1.8 miles S. 79° E. of Vaughan, at an elevation 1440' B., the same seam was once opened, coming 20 feet below the Stockton and 10 feet above the Coalburg. At this point there was cannel, bone, and coal on the dump but the cross-section was not exposed. In Hamilton District it is stated by Dr. Price that this coal is apparently found in close conjunction with the Coalburg on the hillside north of McMillion Creek, 2.5 miles N. 10° E. of Persinger, where a total thickness of 17' 10" of coal and slate was recorded, the upper portion probably representing the Coalburg "A." The details of this exposure are recorded under the description of the **J. H. Baker Prospect No. 384**, on a subsequent page under the description of the Coalburg Coal.

The coal appears to be of no apparent value except as a stratigraphic marker.

COALBURG SHALE.

The **Coalburg Shale**, not previously described, is a dark-gray, or black, argillaceous stratum, coming just above the Coalburg Coal, as exposed at the **Mollie Frame Farm Mine (No. 360 on Map II)**, located on the south side of Birch River, Hamilton District, 0.3 mile west of Birch River village. At this point the shale is only 0' 3" thick but one well-preserved marine fossil (*Orbiculoidea capuliformis*) was found. At the south end of Powell Mountain, on Brushy Fork of Muddlety Creek, there is 5 feet of this shale exposed in the public road, one mile northeastward from Hookersville, at an elevation of 2008' L., being black and fissile, with plant fossils and shells of brackish-water or possibly marine origin.

It is not quite clear whether the Coalburg Shale belongs above or below the Coalburg "A" Coal, as the two members were not noted in conjunction, but the interval separating the Coalburg Coal from the Coalburg "A" in Jefferson District and the fact that this portion of the Kanawha Group in that region is apparently occupied by shale would indicate that the two members have been described in their proper sequence.

COALBURG (QUAKERTOWN "RIDER"?) COAL.

The **Coalburg Coal** of White²⁴, named from its occurrence at Coalburg, Kanawha County, where it has long been mined, and belonging in Nicholas 50 to 100 feet below the Kanawha Black Flint, and 175 to 225 feet below the top of the Homewood Sandstone, has been prospected at numerous points in northern Nicholas County where its horizon is present, and has been mined on a commercial basis on the waters of Twentymile Creek, Jefferson District. It is somewhat irregular in its occurrence, varying in thickness from 2 to 10 feet and in some instances exceeding the latter figure, being multiple-bedded, with several seams of shale or slate, when-

²⁴I. C. White, Bull. 65, U. S. Geol. Survey, p. 162; 1891; and Vol. II, W. Va. Geol. Survey, pp. 548-556; 1903.

ever the maximum thickness is exposed. Its character and areal extent, together with detailed bed-sections and chemical analyses will be presented in Chapter X, under the subject of "Commercial Coal," and its outcrop is delineated on Map II.

The proper position of the Coalburg Coal in the Pennsylvania classification is uncertain since the evidence concerning its northeastward counterpart, if any such exists, is still inconclusive. In a former Report²⁵ the writer has stated the belief that the Quakertown Coal of Pennsylvania belongs either at the Coalburg or Winifrede horizon, the evidence favoring the latter seam. If that supposition is true, then the Coalburg most probably correlates with the **Quakertown "Rider" Coal** of the writer²⁶, which at its type locality in Randolph County belongs only a few feet below the Upper Connoquenessing Sandstone. As stated in the Webster Report²⁷ the lenticular character and almost total disappearance of the Coalburg in certain sections of the northern portion of that county would indicate a rapid thinning northeastward and it may well be possible that the Quakertown "Rider" of Randolph is its final northern phase.

The **Quakertown Black Slate** of the writer²⁸, named from its occurrence along the Tygart Valley River in northern Randolph County, where it occurs just above the Quakertown (Winifrede?) Coal, was not observed in Nicholas and it is not certain whether its true position should be immediately below the Coalburg or just above the Winifrede Coal, as other members not present at its type locality have developed southwestward between the two members last named.

LITTLE COALBURG COAL.

The **Little Coalburg Coal** of Hennen and the writer²⁹, named from its occurrence in northern Logan County, is present in certain localities in northern Nicholas, being usual-

²⁵D. B. Reger, Barbour, Upshur and Western Portion of Randolph Report, W. Va. Geol. Survey, p. 274; 1918.

²⁶Ibid., p. 273.

²⁷D. B. Reger, Webster Report, W. Va. Geol. Survey, p. 154; 1920.

²⁸D. B. Reger, Barbour, Upshur and Western Portion of Randolph Report, W. Va. Geol. Survey, pp. 273-274; 1918.

²⁹Hennen and Reger, Logan and Mingo Report, W. Va. Geol. Survey, pp. 140-141; 1914.

ly slaty and thin, seldom exceeding one foot in thickness, its interval below the Coalburg varying from 15 to 30 feet, and the coal having no economic or commercial importance. The following exposures were noted:

Coal Exposure—No. 403 on Map II.

Grant District, on hillside south of Twentymile Creek, 0.8 mile S. 67° W. of Harriet; **Little Coalburg Coal**; elevation, 1435' B.

	Ft.	In.
Shale, black	1	0
Coal	1	3
Shale and concealed	15	0

Coal Exposure—No. 404 on Map II.

Hamilton District, on hillside north of Ramp Run, 3.2 miles S. 72° E. of Widen and 1.4 miles N. 85° W. of Young's Monument; **Little Coalburg Coal**; elevation, 1360' B.

	Ft.	In.
Shale, dark, sandy	4	0
Coal, hard	0	8

Coal Blossom—No. 405 on Map II.

Hamilton District, on hillside east of Birch River, 0.8 mile N. 26° W. of Birch River village; **Little Coalburg Coal**; elevation, 1275' B. **Coal blossom**, thickness not determined.

James W. Hoover Mine—No. 406 on Map II.

Hamilton District, on hillside south of Birch River, 1.3 miles N. 42° E. of Birch River village; **Little Coalburg Coal**; elevation, 1320' B.; observation by Price.

	Ft.	In.
Sandstone, massive		
Coal, soft	0'	4½"
Shale, fissile, black	0	1
Shale, gray, argillaceous	0	6
Coal, medium-hard	0	10
Shale, gray	0	2
Coal, medium-hard	0	4½
Fire clay shale, gray	2	4

Coal Blossom—No. 407 on Map II.

Beaver District, in road west of Beaver Creek, 2.2 miles S. 33° W. of Delphi; **Little Coalburg Coal**; elevation, 2270' B. **Coal blossom**, thickness not determined.

LOWER COALBURG SANDSTONE.

The **Lower Coalburg Sandstone** of Hennen and the writer³⁰, named from its occurrence in Logan and Mingo Counties, and belonging in Nicholas County a few feet below the Little Coalburg Coal, was noted at a few localities, being gray and massive and normally from 10 to 25 feet in thickness but sometimes uniting with the Upper Winifrede below it to make a solid ledge from 50 to 100 feet thick. In Chapter IV it is noted in the sections for Bintree, Harriet (North), Hookersville, Lockwood, Shant Branch of Powell Creek, and Swiss. So far as known it has not been quarried in the county but it could be used for massive masonry if desired.

The **Buffalo Creek Coal** of White³¹, which he regards as the Winifrede, and the **Buffalo Creek Limestone** of Hennen and the writer³², were not observed in Nicholas, their type locality being in Mingo County where the Kanawha Group has a greater thickness and contains more stratigraphic members.

UPPER WINIFREDE SANDSTONE.

The **Upper Winifrede Sandstone** of White³³, coming at its type locality at Winifrede, Kanawha County, just above the Winifrede Coal, seems to be represented in Nicholas by a massive, gray stratum, normally 10 to 30 feet in thickness, but sometimes developing lenses of 50 to 75 feet. In Chapter IV it is noted in the sections for Camden-on-Gauley, Gilboa, Mudlick Run of Anthony Creek, Panther Mountain, and Skyles. So far as known it has not been quarried in the county but would furnish durable stone for massive masonry construction if desired.

WINIFREDE COAL.

The **Winifrede Coal** of White³⁴, named from its occur-

³⁰Ibid., p. 141.

³¹I. C. White, Vol. II(A), W. Va. Geol. Survey, pp. 415-419; 1908.

³²Hennen and Reger, Logan and Mingo Report, W. Va. Geol. Survey, p. 143; 1914.

³³I. C. White, Vol. II(A), W. Va. Geol. Survey, p. 271; 1908.

³⁴I. C. White, Bull. 65, U. S. Geol. Survey, p. 162; 1891; and Vol. II, W. Va. Geol. Survey, p. 556; 1903.

rence at Winifrede, Kanawha County, where it has been mined extensively, belongs in Nicholas County from 100 to 150 feet below the Kanawha Black Flint, and from 250 to 300 feet below the top of the Homewood Sandstone. It is sometimes multiple-bedded, with both soft and splinty benches of coal, sometimes reaching a thickness of four feet or more, but is normally single-bedded, with a thickness of three feet or less. Its character and areal extent, together with detailed bed-sections and chemical analyses, will be discussed in full in Chapter X, under the subject of "Commercial Coal." Its outcrop is not shown on Map II but as its position is only 50 to 80 feet below the Coalburg, it may be readily located from the outcrop line of the latter seam.

The position of the Winifrede Coal in the Pennsylvania classification is not altogether certain but in previous Reports³⁵ the writer has expressed the belief that it most probably correlates with the **Quakertown Coal**, so termed by I. C. White from its occurrence at the village of that name on the Mahoning River near the Ohio-Pennsylvania State Line. In addition to the evidence presented in the Reports referred to, the writer has recently measured a full section of the Pottsville Series on Coal Run of Otter Creek, 3 miles southward from Hendricks, Tucker County, in the northeastern part of the State where the series has a total thickness of 620 feet. That portion of the section pertinent to this discussion is as follows:

Coal Run of Otter Creek Section.

	Thickness.	Total.
	Feet.	Feet.
Sandstone, massive, very pebbly, Homewood , makes plateau, (top, 3220' B.).....	65	65
Concealed	40	105
Sandstone, massive, pebbly, Upper Connoquenessing	75	180
Concealed, with shale	40	220
Shale, sandy, Quakertown	14	234
Coal, soft .....1' 1" } (2' 0") (2984' B.)		
Shale, dark .....1 8 } Quakertown (Winifrede)	2	236
Coal, bony .....0 3 }		
Fire clay shale, dark	3½	239½
Coal, slaty (0' 6") (2980' B.).....	0½	240
Shale, sandy, dark, with plant fossils, and Lingulae near middle, Winifrede Limestone	20	260

³⁵D. B. Reger, Barbour, Upshur and Western Portion of Randolph Report, W. Va. Geol. Survey, p. 274; 1918; and Webster Report, W. Va. Geol. Survey, pp. 155-157; 1920.

The discovery of fossils at this point in the shale coming only a few feet below the undoubted Quakertown Coal, and having approximately the same interval below the top of the Homewood Sandstone as that found by Hennen³⁶ at Palmer, Braxton County, where the Winifrede Limestone was apparently identified beyond serious doubt, tends strongly to verify the earlier belief of the writer that the Quakertown and Winifrede Coals are one and the same.

The **Lower Winifrede Coal** of Krebs³⁷, was not observed in Nicholas, and being strictly a southern development, has probably disappeared from the measures in this county.

LOWER WINIFREDE SANDSTONE.

The **Lower Winifrede Sandstone** of White³⁸, coming a few feet under the Winifrede Coal, seems to be present in Nicholas, though it is not conspicuous, its thickness being from 10 to 25 feet.

CHILTON "A" COAL.

The **Chilton "A" Coal** of Hennen and the writer³⁹, named from its occurrence in Logan and Mingo Counties, and coming just below the Lower Winifrede Sandstone, was questionably identified at a few points in northern Nicholas, being, as a rule, thin and slaty, seldom reaching two feet, and often being altogether absent. Its occurrence is entirely too lenticular for it to be classed as an economic resource, its only value being as a stratigraphic marker. The following exposures were observed:

Coal Blossom—No. 431 on Map II.

Grant District, on a short branch of Peters Creek, 0.8 mile northwest of Gilboa; **Chilton "A" Coal**; elevation, 1940' B.
Coal blossom, thickness not determined.

³⁶Ray V. Hennen, Braxton and Clay Report, W. Va. Geol. Survey, pp. 97-98; 1917.

³⁷C. E. Krebs, Raleigh Report, W. Va. Geol. Survey, p. 339; 1916.

³⁸I. C. White, Vol. II(A), W. Va. Geol. Survey, p. 271; 1908.

³⁹Hennen and Reger, Logan and Mingo Report, W. Va. Geol. Survey, pp. 146-147; 1914.

Hale McKinney Farm Mine (Obbe Land)—No. 432 on Map II.

Hamilton District, on Little Run of Powell Creek, 1.4 miles south of Birch River village; **Chilton "A" Coal**; elevation, 1350' B.; observation by Price; opening fallen shut.

	Ft.	In.
Roof, sandstone, shaly.....	..	..
Shale, gray	2	6
Coal, reported, no binder	1	6

Davy Frame Farm Mine—No. 433 on Map II.

Hamilton District, on hillside east of Lick Run of Powell Creek, 1.6 miles S. 2° W. of Birch River village; **Chilton "A" Coal**; elevation, 1340' B.; observation by Price.

	Ft.	In.
Sandstone, massive .....	..	..
Shale, dark, soft	0'	0¾"
Coal, bony	0	3
Coal, soft	1	0½
Shale, black, bony	0	2¼
	1	6½
Shale, gray, argillaceous, pavement		

Coal Exposure—No. 434 on Map II.

Hamilton District, on hillside west of Muddlety Creek, 0.7 mile S. 22° W. of Hookersville; **Chilton "A" Coal**; elevation, 1930' B.; observation by Price.

Coal and black shale, thickness not determined.

Coal Blossom—No. 435 on Map II.

Beaver District, on hillside west of Little Beaver Creek, 2.0 miles N. 36° E. of Persinger; **Chilton "A" Coal**; elevation, 2310' B. Spring, with coal blossom.

Coal Prospect—No. 436 on Map II.

Beaver District, in road north of Beaver Creek, 2.2 miles S. 30° W. of Delphi; **Chilton "A" Coal**; elevation, 2225' B.

	Ft.	In.
Sandstone, massive .....	..	..
Coal, soft	0'	6½"
Coal, bony splint.....	0	4½
Coal, hard, streaks of bone	0	10
	1	9

WINIFREDE LIMESTONE

The Winifrede Limestone of White⁴⁰, named from its

⁴⁰I. C. White, Vol. II(A), W. Va. Geol. Survey, p. 431; 1908.

occurrence at Winifrede, Kanawha County, where it is found 65 to 70 feet below the Winifrede Coal, and where it contains an abundant marine fauna, was observed at a few points in northern Nicholas but in general is poorly represented and lenticular in its occurrence. Its position is from 20 to 50 feet below the Winifrede Coal and apparently just beneath the Chilton "A", and from 275 to 340 feet below the top of the Homewood Sandstone, and it is usually represented by black, fissile shale, sometimes accompanied by nodules of siliceous limestone, the entire bed varying from 1 to 5 feet in thickness, and sometimes containing marine fossils. In the section for Gilboa, page 122, it is noted as a black shale, 1 foot thick, coming 275 feet below the top of the Homewood Sandstone, and containing marine fossils. In the section for Hookersville, page 149, it is recorded as black shale, 5 feet thick, coming just above the Chilton Coal, as would be natural in that region since some of the intermediate members have thinned away. On the west side of Brushy Fork of Muddlety Creek, 2.3 miles northeast of Hookersville, it was found by Dr. Price, at an elevation of 1920' B., and contains marine fossils, being a black, sandy shale, 10 feet in thickness. There is some slight question as to the proper correlation at this point, and the shale may be the Dingess Limestone horizon instead of the Winifrede, as similar fossils are found in the two members and no other evidence was available to check the correlation.

A discussion by Dr. Price of the fossils found at the Winifrede Limestone horizon will be found on subsequent pages in Chapter XIII.

UPPER CHILTON SANDSTONE.

The **Upper Chilton Sandstone** of White⁴¹, named from its occurrence in the Great Kanawha Valley, where it belongs in the interval between the Lower Winifrede Sandstone and the Chilton Coal, was noted at various points in Nicholas, being recorded in Chapter IV in the sections for Gilboa, Panther Mountain, and Swiss, its position being only a few feet above the Chilton Coal. Its thickness is normally 20 to 30 feet but

⁴¹I. C. White, Vol. II(A), W. Va. Geol. Survey, p. 271; 1908.

it sometimes combines with the Lower Winifrede to make a total of 60 to 70 feet. So far as known it has not been quarried, but as it is massive and durable it would furnish stone for rough masonry if desired.

The **Chilton "Rider" Coal** of Hennen and the writer⁴², named from its occurrence on Beech Creek and Dingess Run, Logan County, where it belongs a few feet above the Chilton Coal, was not observed in Nicholas, having evidently disappeared in the northeastward thinning of the measures.

CHILTON COAL.

The **Chilton Coal** of White⁴³, named from its occurrence near the village of Chilton, on Davis Creek, Kanawha County, has been prospected at various points in northern Nicholas, its thickness varying from 1 to 4 feet but usually being 2 feet or less. Inasmuch as it is generally free from slate partings it should eventually furnish a limited amount of commercial fuel. It is usually medium-soft, there being occasional benches of splint and cannel. Its position is from 25 to 50 feet below the Winifrede Limestone and from 350 to 400 feet below the top of the Homewood Sandstone. Its character and areal extent, together with detailed bed-sections and chemical analyses, will be discussed in Chapter X, under the subject of "Commercial Coal."

LOWER CHILTON SANDSTONE.

The **Lower Chilton Sandstone** of Hennen and the writer⁴³, named from its occurrence in Logan and Mingo Counties, is apparently represented in Nicholas, coming a few feet below the Chilton Coal, having a normal thickness of 5 to 20 feet, and being gray and massive. In the section for Panther Mountain, published in Chapter IV, it is recorded as being 85 feet thick, but evidently has combined with the Upper Chilton to form one massive ledge, cutting out the intervening coal. So far as known it has not been quarried in the county but it

⁴²Hennen and Reger, Logan and Mingo Report, W. Va. Geol. Survey, pp. 150-151; 1914.

⁴³I. C. White, Vol. II(A), W. Va. Geol. Survey, p. 430; 1908.

⁴⁴Hennen and Reger, Logan and Mingo Report, W. Va. Geol. Survey, pp. 150-151; 1914.

would furnish stone for rough masonry construction, if its use should be desired.

The **Little Chilton Coal** of Hennen and the writer⁴⁴, belonging a few feet under the Lower Chilton Sandstone at its type locality in Logan and Mingo Counties, was not observed in Nicholas, having evidently disappeared in the northeastward thinning of the measures.

HERNSHAW SANDSTONE.

The **Hernshaw Sandstone** of Hennen and the writer⁴⁵, named from its relationship to the Hernshaw Coal, above which it belongs by an interval of only a few feet, appears to be fairly well represented in Nicholas, being gray and massive, and from 10 to 35 feet thick. In Chapter IV it is noted in the sections for Bintree, Gilboa, and Swiss. So far as known it has not been quarried in the county.

HERNSHAW COAL.

The **Hernshaw Coal** of Hennen and the writer⁴⁶, named from its occurrence at the town of Hernshaw, Kanawha County, where it has been mined commercially, is apparently represented in Nicholas, but is usually multiple-bedded, slaty, and worthless, its thickness varying from 1 to 3 feet, and its position being from 50 to 75 feet below the Chilton Coal and from 400 to 450 feet below the top of the Homewood Sandstone. The following openings and exposures were noted:

Coal Exposure—No. 460 on Map II.

Jefferson District, on hillside south of Spring Branch of Rockcamp Fork of Twentymile Creek, 1.0 mile N. 49° W. of Vaughan; **Hernshaw Coal**; elevation, 960' B.

	Ft.	In.
Coal, about	1	4

Coal Prospect—No. 461 on Map II.

Jefferson District, on hillside west of Rockcamp Fork of Twenty-

⁴⁴Hennen and Reger, Logan and Mingo Report, W. Va. Geol. Survey, pp. 151-155; 1914.

⁴⁵Ibid., pp. 155-156.

⁴⁶Ibid., pp. 156-163.

mile Creek, 0.1 mile south of Greendale; **Hernshaw Coal**; elevation, 945' B.

	Ft.	In.
Sandstone, massive		0
Shale, dark	1	0
Coal	0	4"
Slate, black	0	1
Coal	1	0
Fire clay shale and concealed to railroad	10	0

Coal Prospect—No. 462 on Map II.

Jefferson District, on south side of Twentymile Creek, 0.5 mile above Hardway Branch and 3.8 miles southwest of Harriet; **Hernshaw Coal**; elevation, 1365' B.; for stratigraphic position see Hardway Branch of Twentymile Section, page 111.

Fallen shut, thickness unknown.

Coal Prospect—No. 463 on Map II.

Jefferson District, on the north side of Gauley River, 1.1 miles west of Swiss; **Hernshaw Coal**; elevation, 1240' B.; for stratigraphic position see Swiss Section, page 115.

Coal, at prospect, fallen shut.

Coal Prospect—No. 464 on Map II.

Jefferson District, on hillside west of branch of Laurel Creek, 1.0 mile S. 28° W. of Tipton; **Hernshaw Coal**; elevation, 2090' B.; for stratigraphic position see Panther Mountain Section, page 118.

Fallen shut, thickness unknown.

Coal Exposure—No. 465 on Map II.

Grant District, in road along hillside north of Jerry Fork of Peters Creek, 2.8 miles west of Gilboa; **Hernshaw Coal**; elevation, 1550' B.

	Ft.	In.
Shale, sandy		0
Coal blossom, streak		0
Shale, sandy	4	0
Coal	0	6
Shale, sandy		0

Coal Exposure—No. 466 on Map II.

Grant District, on a short branch of Peters Creek, 0.8 mile northwest of Gilboa; **Hernshaw Coal**; elevation, 1795' B.; for details see Gilboa Section, page 122.

William Vickers Coal Prospect—No. 467 on Map II.

Summersville District, on hillside north of Twentymile Creek, 2.2 miles N. 65° E. of Harriet; **Hernshaw Coal**; elevation, 1305' B.

	Ft.	In.
Sandstone, shaly .....	..	..
Coal	0	7
Shale, pavement		

Coal Prospect—No. 468 on Map II.

Hamilton District, on hillside west of Robinson Fork of Buffalo Creek, 4.5 miles N. 67° W. of Hookersville; **Hernshaw Coal**; elevation, 1230' B.; for stratigraphic position see Isom Branch Section, page 135.

	Ft.	In.
Coal , reported	0	4

Ed. Tree Coal Prospect—No. 469 on Map II.

Hamilton District, on hillside north of Phillips Run of Muddlety Creek, 1.3 miles S. 63° E. of Muddlety; **Hernshaw Coal**; elevation, 2065' B.; observation by Price.

	Ft.	In.
Coal , reported about 0' 6" to	0	8

Coal Blossom—No. 470 on Map II.

Hamilton District, in road along hillside north of Trout Run of Muddlety Creek, 0.6 mile S. 31° W. of Muddlety; **Hernshaw Coal**; elevation, 1930' B.

Coal blossom, streak.

Coal Blossom—No. 471 on Map II.

Hamilton District, on hillside south of a north branch of McMillion Creek, 2.3 miles N. 63° E. of Kirkwood; **Hernshaw Coal**; elevation, 2030' B.; observation by Price.

Coal dirt in log runway.

Hill Groves Coal Prospect—No. 472 on Map II.

Hamilton District, between forks of Brushy Fork of Muddlety Creek, 3.1 miles N. 34° E. of Hookersville; **Hernshaw Coal**; elevation, 1940' B.; observation by Price.

	Ft.	In.
Sandstone, massive .....	..	..
Coal , soft	0' 2"	
Coal , hard, splint	0 8	0 10
Shale		

Coal Stripping—No. 473 on Map II.

Hamilton District, in a left branch of Brushy Fork of Muddlety

Creek, 3.3 miles N. 30° E. of Hookersville; **Hernshaw Coal**; elevation, 1890' B.; observation by Price.

Coal stripping, thickness unknown.

Abram Hinkle Coal Prospect—No. 474 on Map II

Beaver District, on hillside west of Little Beaver Creek, 1 mile northwest of Calvin; **Hernshaw Coal**; elevation, 2300' B.; observation by Price.

		Ft.	In.
Shale			
Coal, bony, cannel.....	0' 1 "		
Coal, medium-hard	0 5½		
Bone	0 3		
Coal, visible	1 11	2	8½

Concealed by water

Reed Hickman Coal Prospect—No. 475 on Map II.

Beaver District, on hillside west of Little Beaver Creek, 1.2 miles northwest of Calvin; **Hernshaw Coal**; elevation, 2265' B.; fallen shut, reported as follows:

		Ft.	In.
Slate, black			
Coal	0' 3"		
Slate, dark	0 2		
Coal, splinty	0 7		
Slate, dark	0 2		
Coal, medium-hard	1 7		
Coal, bony	0 2		
Coal	1 0	3	11

Slate, pavement

W. E. Morton Farm Mine—No. 478 on Map II.

Beaver District, on hillside east of Little Beaver Creek, 0.8 mile northward from Calvin; **Hernshaw Coal**; elevation, 2335' B.; observation by Price.

		Ft.	In.
Shale			
Bone		0	3
Coal	0' 9 "		
Shale	0 2½		
Coal	1 5½	2	5

Niggerhead, reported

Shale

NAUGATUCK SANDSTONE.

The **Naugatuck Sandstone** of Hennen and the writer⁴⁷, named from its occurrence near the village of Naugatuck, Mingo County, coming normally a few feet below the Hern-

⁴⁷Ibid, pp. 163-164.

shaw Coal, is not prominent in Nicholas County, its horizon being often occupied completely by sandy shale, with thin streaks of sandstone.

DINGESS COAL.

The **Dingess Coal** of Hennen and the writer⁴⁸, named from the village of Dingess, Mingo County, where the coal was once mined on a commercial basis, appears to be only slightly represented in Nicholas County. A black slate horizon, coming 35 feet below the Hernshaw Coal, appears to belong at this horizon, as recorded in the section for Panther Mountain, page 118, and the following exposure, coming 20 feet above the Williamson Coal, seems to belong at this horizon in Hamilton District:

Coal Exposure—No. 479 on Map II.

Hamilton District, on south side of Muddlety Creek, 0.6 mile west of Opal; **Dingess Coal**; elevation, 1920' B.; observation by Price.

	Ft.	In.
Sandstone, shaly .....	..	..
Shale, dark .....	..	..
Coal	0	3
Clay and shale	4	0

The statement has been made by Hennen⁴⁹ that he now considers the coal at Naugatuck the same as the Williamson Coal of Mingo County, and if that be true the two exposures noted above may represent stray streaks not classified in the general section of the Pottsville.

WILLIAMSON SANDSTONE.

The **Williamson Sandstone** of Hennen and the writer⁵⁰, named from its association with the Williamson Coal, above which it comes by an interval of a few feet, is apparently represented in certain localities of northwestern Nicholas, its normal thickness being 5 to 20 feet. In the section for Panther Mountain, page 118, it is recorded as 30 feet thick

⁴⁸Ibid., pp. 164-165.

⁴⁹Ray V. Hennen, Fayette Report, W. Va. Geol. Survey, p. 246; 1919.

⁵⁰Hennen and Reger, Logan and Mingo Report, W. Va. Geol. Survey, p. 165; 1914.

and massive. So far as known it has not been quarried in the county.

DINGESS LIMESTONE.

The **Dingess Limestone** of Hennen and the writer⁵¹, named from its occurrence near the village of Dingess, Mingo County, where it was discovered by the latter author, and being of wide-spread occurrence throughout the Guyandot and Great Kanawha Valleys, where its usual character is that of a siliceous or ferruginous shale, often containing limestone nodules and frequently carrying marine fossils in profusion, was observed at various points in northern Nicholas. Its character is usually that of a dark, argillaceous or ferruginous shale, 1 to 5 feet in thickness, and its position is just above the Williamson Coal, its interval from the top of the Homewood Sandstone being 400 to 500 feet, depending on the locality. In Jefferson District, where it is best developed, it comes 250 to 275 feet below the Coalburg Coal.

In **Jefferson District**, the shale is well exposed above an opening in the Williamson Coal on the hillside west of Lick Branch of Open Fork of Bells Creek, 1.2 miles northeast of Dixie, at an elevation of 1015' B., where it contains marine fossils in profusion. It was observed again on the hillside east of Rockcamp Fork of Twentymile Creek, 0.8 mile northeast of Vaughan, at an elevation of 920' B., and at this point also contains marine fossils. In **Summersville District**, it was noted on the hillside south of Twentymile Creek, 3.4 miles northeast of Harriet, at an elevation of 1375' B., coming over an old prospect in the Williamson Coal and containing fossils; also on Fockler Branch of Muddlety Creek, 2.2 miles southwest of Muddlety village, at an elevation of 1900' B., containing fossils; also on the hillside north of Robinson Fork of Buffalo Creek, 2 miles southeast of Dade, at an elevation of 1475' B., being 15 feet thick, with turtleback limestone concretions, and containing marine fossils. In **Hamilton District**, it was noted on the hillside west of Hogpen Run of Robinson Fork, 3 miles northeast of Dade, at an elevation of 1280'

⁵¹Ibid., pp. 165-166.

B., containing marine fossils; also on Paddy Run of Muddlety Creek, just west of Hookersville, at an elevation of 1865' B., being 10 feet thick, with no fossils noted, although a considerable search was made both by Price and the writer. It is exposed along the public highway on Muddlety Creek, 0.7 mile northeast of Muddlety village, at an elevation of 1880' B., coming just over the Williamson Coal and containing marine fossils. It is reported by Price as being visible on the hillside east of Muddlety Creek, 0.7 mile southeast of Hookersville, at an elevation of 1965' B.; also on the hillside south of Muddlety Creek, 1 mile southeast of Muddlety village, at an elevation of 1925' B.; also on Muddlety Creek, 0.2 mile west of Opal, at an elevation of 1910' B., being visible in the highway cut and containing marine fossils.

The thickness, color, and general characteristics of the shale at nearly all of these points are recorded in subsequent pages under the description of the Williamson Coal, to which reference is here made for these details, and in Chapter XIII will be found a description by Dr. Price of the fossils collected by himself and the writer at several localities.

WILLIAMSON COAL.

The **Williamson Coal** of Hennen and the writer⁵², named from its occurrence a few feet above the Cedar Grove Coal in Logan and Mingo Counties, is represented generally over northern Nicholas where its horizon occurs, being just under the Dingess Limestone, and 450 to 525 feet below the top of the Homewood Sandstone. As a rule it is soft and multiple-bedded, being from 1 to 4 feet thick, and worthless from a commercial standpoint on account of its numerous partings and lenticular character. The following exposures were noted:

Coalbell Coal Company Prospect—No. 480 on Map II.

Jefferson District, on hillside west of Lick Branch of Open Fork of Bells Creek, 0.9 mile east of Cambria; **Williamson Coal**; elevation, 1015' B.

⁵²Ibid., pp. 166-168.

		Ft.	In.
Shale, dark, with marine fossils, Dingess Limestone		5	0
Coal, soft	0' 3"		
Slate, black	0 1		
Coal, soft	1 1		
Slate, black	0 1		
Coal, soft	0 8		
Shale, gray	0 8		
Coal, bony	0 2		
Shale, gray	0 3		
Coal	0 4	3	7

Fire clay shale

Coal Exposure—No. 481 on Map II.

Jefferson District, on hillside east of Rockcamp Creek, 0.4 mile, south of Greendale; **Williamson Coal**; elevation, 920' B.

		Ft.	In.
Shale, dark, with marine fossils, Dingess Limestone		5	0
Coal	0' 6"		
Slate, gray	0 3		
Coal	0 6	1	3

Fire clay 1 0
Sandstone to creek 10 0

Coal Exposure—No. 482 on Map II.

Jefferson District, on hillside north of Hardway Branch of Twentymile Creek, 3.6 miles S. 53° W. of Harriet; **Williamson Coal**; elevation, 1300' B.; for details, see Hardway Branch of Twentymile Section, page 111.

Coal Blossom—No. 483 on Map II.

Grant District, on west side of Road Fork of Robinson Fork of Twentymile Creek, 2.1 miles S. 30° W. of Harriet; **Williamson Coal**; elevation, 1280' B.

Coal blossom, thickness not determined.

Coal Blossom—No. 484 on Map II.

Grant District, in road along hillside west of Hutchinson Branch of Peters Creek, 0.6 mile N. 33° W. of Gilboa; **Williamson Coal**; elevation, 1765' B.; for details, see Gilboa Section, page 122.

Coal Blossom—No. 485 on Map II.

Summersville District, on hillside north of Twentymile Creek, 1.4 miles S. 49° W. of Dade; **Williamson Coal**; elevation, 1460' B.

Coal blossom, at top of sandstone, thickness not determined.

G. W. Fockler Prospect—No. 486 on Map II.

Summersville District, on hillside north of Fockler Branch of

Muddlety Creek, 1.6 miles S. 25° W. of Muddlety; **Williamson Coal**; elevation, 1895' B.

	Ft.	In.
Shale, black, Dingess Limestone		
Coal , (concealed), reported.....	1	10

Coal Exposure—No. 487 on Map II.

Summersville District, on hillside north of Fockler Branch of Muddlety Creek, 1.9 miles S. 25° W. of Muddlety; **Williamson Coal**; elevation, 1890' B.

	Ft.	In.
Shale, black, Dingess Limestone		
Coal	0'	5"
Shale, dark.....	0	8
Coal , thickness concealed.....		

Coal Blossom—No. 488 on Map II.

Summersville District, on hillside north of Fockler Branch of Muddlety Creek, 1.9 miles S. 26° W. of Muddlety; **Williamson Coal**; elevation, 1890' B.

Coal blossom, thickness not determined.

G. W. Fockler Coal Prospect—No. 489 on Map II.

Summersville District, on Fockler Branch of Muddlety Creek, 2.2 miles S. 27° W. of Muddlety; **Williamson Coal**; elevation, 1900' B.

	Ft.	In.
Shale, black, with marine fossils, Dingess Limestone	5	0
Coal , hard	1	2
Slate, pavement		

Coal Exposure—No. 490 on Map II.

Hamilton District, on hillside west of Robinson Fork of Buffalo Creek, 3.2 miles S. 46° E. of Eakle; **Williamson Coal**; elevation, 1180' B.

	Ft.	In.
Shale, sandy, Dingess Limestone		
Coal	0	4
Shale, sandy		

Coal Prospect—No. 491 on Map II.

Hamilton District, on hillside south of Hogpen Run of Robinson Fork of Buffalo Creek, 3.8 miles N. 66° W. of Hookersville; **Williamson Coal**; elevation, 1280' B.

	Ft.	In.
Shale, black, with marine fossils, Dingess Limestone ..	..	..
Coal	0'	0½"
Slate, dark	0	2½
Coal	0	1
Shale, dark	0	9
Coal, soft	1	0
Coal, bony	0	2
	<hr/>	
Slate, pavement, and concealed	12	0

L. W. Herold Coal Stripping—No. 492 on Map II.

Hamilton District, on Paddy Run, 0.2 mile west of Hookersville; **Williamson Coal**; elevation, 1865' B.

	Ft.	In.
Shale, dark, Dingess Limestone ..	..	..
Coal, splinty at top, 1' 3" to ..	1	5
Shale, in run		

Coal Exposure—No. 493 on Map II.

Hamilton District, on hillside south of Muddlety Creek, 1.1 miles east of Hookersville; **Williamson Coal**; elevation, 1925' B.; observation by Price.

	Ft.	In.
Shale, black, Dingess Limestone	3	0
Coal, hard	0	9
Concealed in water		

J. A. Brock Coal Prospect—No. 494 on Map II.

Hamilton District, on hillside south of Muddlety Creek, 0.6 mile N. 79° W. of Opal; **Williamson Coal**; elevation, 1900' B.; observation by Price.

	Ft.	In.
Shale, sandy, Dingess Limestone ..	..	..
Shale, black	0	2
Coal, soft	1	10
Shale, pavement		

Coal Exposure—No. 495 on Map II.

Hamilton District, on hillside north of Muddlety Creek, 0.4 mile N. 61° W. of Opal; **Williamson Coal**; elevation, 1910' B.; observation by Price.

	Ft.	In.
Shale, fossiliferous, Dingess Limestone
Coal, thickness not determined		

Coal Exposure—No. 496 on Map II.

Hamilton District, on hillside north of Muddlety Creek, 0.2 mile N. 70° W. of Opal; **Williamson Coal**; elevation, 1900' B.

	Ft.	In.
Sandstone, shaly, Williamson .....	..	..
Shale, black, Dingess Limestone	5	0
Coal	0	10
Shale, sandy	5	0

G. W. Craig Coal Prospect—No. 497 on Map II.

Hamilton District, on hillside south of Muddlety Creek, 2.0 miles N. 59° E. of Muddlety; **Williamson Coal**; elevation, 1965' B.; observation by Price.

	Ft.	In.
Shale, black, fissile, with marine fossils, Dingess Limestone	3	0
Coal, visible	0'	6"
Coal, reported about	0	4

Coal Blossom—No. 498 on Map II.

Hamilton District, in road, west side of Muddlety Creek, 0.9 mile northeast of Muddlety; **Williamson Coal**; elevation, 1855' B.

	Ft.	In.
Shale, dark, sandy, ferruginous, Dingess Limestone	20	0
Coal, streak		
Fire clay shale		

Coal Exposure—No. 499 on Map II.

Hamilton District, in road, west side of Muddlety Creek, 0.5 mile N. 46° E. of Muddlety; **Williamson Coal**; elevation, 1880' B.

	Ft.	In.
Shale, sandy, dark, with marine fossils, Dingess Limestone	10	0
Coal	0	6
Fire clay shale		

Coal Blossom—No. 500 on Map II.

Hamilton District, on hillside west of Muddlety Creek, 0.5 mile S. 17° W. of Muddlety; **Williamson Coal**; elevation, 1900' B.
Coal blossom, thickness not determined.

UPPER CEDAR GROVE SANDSTONE.

The Upper Cedar Grove Sandstone of Hennen and the writer⁵³, named from its occurrence a few feet above the Cedar

⁵³Ibid., pp. 169-170.

Grove Coal in Logan and Mingo Counties, is represented generally in the northern half of Nicholas, being gray and massive and varying in thickness from 10 to 40 feet. In Chapter IV it is noted in the sections for Anthony Creek (Mouth), Bintree, Greendale, and Panther Mountain. So far as known it has not been quarried but it could be used for rough structures where massive masonry is desired.

SETH LIMESTONE.

The **Seth Limestone** of Krebs⁵⁴, named from its occurrence near the village of Seth, Boone County, where it comes in the roof shales of the Cedar Grove Coal and contains marine fossils, does not appear to be prominent in Nicholas. It was questionably identified in the Panther Mountain Section, page 118, being hard, gray, and two feet thick, and coming 95 feet above the Peerless Bench of the Campbell Creek Coal. Elsewhere it was not observed, but it is possible that a diligent search might reveal its fossils in the western portion of the county.

A sample (No. 316R) collected from the land of Frank Johnson on the south side of Panther Mountain, as mentioned above, shows the following composition, according to Messrs. Hite and Krak:

	Per cent.
Silica (SiO ₂)	18.87
Ferric Iron (Fe ₂ O ₃)	7.43
Alumina (Al ₂ O ₃)	3.39
Calcium Carbonate (CaCO ₃).....	64.77
Magnesium Carbonate (MgCO ₃)	1.92
Potassium (K ₂ O)	1.80
Sodium (Na ₂ O)	0.75
Loss on ignition	1.09
Total.....	100.02

CEDAR GROVE COAL.

The **Cedar Grove Coal** of White⁵⁵, named from its occurrence at the village of Cedar Grove, Kanawha County, where it has been mined commercially for many years, was observed

⁵⁴C. E. Krebs, Boone Report, W. Va. Geol. Survey, p. 155; 1915.

⁵⁵I. C. White, Bull. 65, U. S. Geol. Survey, pp. 138-140; 1891; and Vol. II, W. Va. Geol. Survey, p. 562; 1903.

at various points in northern Nicholas but appears to be too thin and irregular to be of commercial importance. Its position in the series is from 475 to 550 feet below the top of the Homewood Sandstone and from 175 to 250 feet above the Eagle Coal. It varies in thickness from 1 to 3 feet, being usually multiple-bedded and slaty when the latter figure is approached, there being benches of both soft and splinty coal. The following prospects and exposures were noted:

Coal Blossom—No. 501 on Map II.

Jefferson District, on east side of Open Fork of Bells Creek 0.1 mile south of Bentree; **Cedar Grove Coal**; elevation, 840' B.; for stratigraphic position, see Bentree Section, page 108.

Coal blossom, thickness unknown.

Coal Prospect—No. 502 on Map II.

Jefferson District, on hillside south of Twentymile Creek, 3.4 miles N. 76° E. of Vaughan; **Cedar Grove Coal**; elevation, 1110' B.; fallen shut.

	Ft.	In.
Coal , reported by Jerry Neil	3	6

Coal Prospect—No. 503 on Map II.

Jefferson District, on south side of Twentymile Creek, 0.6 mile above Hardway Branch, and 3.8 miles southwest of Harriet; **Cedar Grove Coal**; elevation, 1265' B.; fallen shut; for stratigraphic position see Hardway Branch of Twentymile Section, page 111.

Coal Blossom—No. 504 on Map II.

Grant District, on west side of Road Fork of Robinson Fork of Twentymile Creek, 2.0 miles S. 20° W. of Harriet; **Cedar Grove Coal**; elevation, 1250' B.

Coal blossom, heavy.

Coal Blossom—No. 505 on Map II.

Grant District, on north side of Twentymile Creek, 0.7 mile west of Harriet; **Cedar Grove Coal**; elevation, 1235' B.; for stratigraphic position, see Harriet (North) Section, page 121.

Coal blossom, thickness not determined.

Coal Prospect—No. 506 on Map II.

Grant District, on hillside west of Hutchinson Branch of Peters

Creek, 0.6 mile N. 24° W. of Gilboa; **Cedar Grove Coal**; elevation, 1710' B.; for stratigraphic position see Gilboa Section, page 123.

	Ft.	In.
Coal , with cannel bone, about	2	0

Coal Exposure—No. 507 on Map II.

Summersville District, on hillside south of Twentymile Creek, 3.0 miles N. 72° E. of Harriet; **Cedar Grove Coal**; elevation, 1350' B.

	Ft.	In.
Sandstone, massive .....	..	..
Coal , hard	0'	6"
Slate, black, bony	0	2
Coal , soft.....	0	3
Shale, sandy, and concealed to creek.....	15	0

Coal Exposure—No. 508 on Map II.

Hamilton District, on hillside east of Birch River 0.7 mile N. 48° W. of Birch River village; **Cedar Grove Coal**; elevation, 1090' B.

	Ft.	In.
Sandstone, flaggy, Upper Cedar Grove	10	0
Concealed, horizon of Seth Limestone	10	0
Coal	1	2
Shale, dark, sandy	5	0

Coal Exposure—No. 509 on Map II.

Hamilton District, on hillside east of Powell Creek, 0.2 mile south of Birch River village; **Cedar Grove Coal**; elevation, 1145' B.

	Ft.	In.
Sandstone, massive, Upper Cedar Grove	20	0
Coal	0'	4
Sandstone, shaly	7	0
Shale, dark, sandy, to grade	3	0

Margaret Strange Prospect—No. 510 on Map II.

Hamilton District, on a private road leading west from Barnet Run of Birch River, 1.2 miles S. 78° W. of Boggs; **Cedar Grove Coal**; elevation, 1805' B.

	Ft.	In.
Sandstone, massive, Upper Cedar Grove .....	..	..
Coal	1	4
Slate, pavement		

Coal Stripping—No. 511 on Map II.

Hamilton District, on Muddlety Creek, 1.0 mile S. 81° E. of Hookersville; **Cedar Grove Coal**; elevation, 1890' B.; observation by Price.

	Ft.	In.
Coal, reported	1	0

John Hill Coal Stripping—No. 512 on Map II.

Hamilton District, on Muddlety Creek, 1.8 miles N. 72° E. of Hookersville; **Cedar Grove Coal**; elevation, 1885' B.; observation by Price.

	Ft.	In.
Shale, black, fissile, roof .....	..	..
Coal	1	10

Coal Exposure—No. 513 on Map II.

Hamilton District, in bed of Muddlety Creek, 1.8 miles N. 81° E. of Hookersville; **Cedar Grove Coal**; elevation, 1870' B.; observation by Price; thickness unknown.

Coal Prospect—No. 514 on Map II.

Hamilton District, on hillside north of Muddlety Creek, 0.2 mile north of Opal; **Cedar Grove Coal**; elevation, 2035' B.; observation by Price.

	Ft.	In.
Coal, less than.....	1	0

Coal Blossom—No. 515 on Map II.

Hamilton District, on hillside west of Muddlety Creek, 0.2 mile south of Hookersville; **Cedar Grove Coal**; elevation, 1855' B.
Coal blossom, thickness not determined.

Coal Stripping—No. 516 on Map II.

Hamilton District, on east hillside of Muddlety Creek, 0.8 mile S. 38° E. of Hookersville; **Cedar Grove Coal**; elevation, 1915' B.

	Ft.	In.
Coal, clean, reported.....	2	0

Coal Blossom—No. 517 on Map II.

Hamilton District, on hillside east of Muddlety Creek, 0.7 mile S. 23° E. of Hookersville; **Cedar Grove Coal**; elevation, 1915' B.; observation by Price.

	Ft.	In.
Coal, hard	0	8

Coal Blossom—No. 518 on Map II.

Hamilton District, on west hillside of Muddlety Creek, 0.3 mile south of Muddlety; **Cedar Grove Coal**; elevation, 1860' B.
Coal blossom, thickness not determined.

Coal Blossom—No. 519 on Map II.

Hamilton District, on hillside south of a southeast branch of Persinger Creek, 0.7 mile N. 72° E. of Persinger; **Cedar Grove Coal**; elevation, 2455' B.; observation by Price.

	Ft.	In.
Coal blossom, supposed to be cannel, with thickness		
of	3	0

Henry Herold Coal Prospect—No. 520 on Map II.

Beaver District, on Persinger Creek, 1.5 miles east of Persinger; **Cedar Grove Coal**; elevation, 2500' B.; observation by Price.
Fallen shut, thickness unknown.

Coal Blossom—No. 521 on Map II.

Beaver District, in road along hillside west of Beaver Creek. 2.0 miles S. 16° W. of Delphi; **Cedar Grove Coal**; elevation, 2240' B.
Coal blossom, thickness not determined.

MIDDLE CEDAR GROVE SANDSTONE.

The **Middle Cedar Grove Sandstone** of Hennen and the writer⁵⁵, named from its occurrence in Logan and Mingo Counties, where it comes a few feet below the Cedar Grove Coal, is apparently poorly represented in Nicholas, having been noted in Chapter IV in the sections for Gilboa and Harriet.

The **Lower Cedar Grove Coal** of Hennen and the writer⁵⁶, named from its occurrence in Logan and Mingo Counties, where it comes a short distance below the Cedar Grove Coal, being separated from the latter by the Middle Cedar Grove Sandstone, was not observed in Nicholas.

PEERLESS SANDSTONE.

The **Peerless Sandstone** of Krebs⁵⁷, named from its occurrence at the mouth of Campbell Creek, Kanawha County, where it belongs 30 to 40 feet above the Campbell Creek Coal (Peerless Bench), is represented in Nicholas, being massive, gray, and 10 to 30 feet thick. In Chapter IV it is noted in

⁵⁵Hennen and Reger, Logan and Mingo Report, W. Va. Geol. Survey, pp. 172-173; 1914.

⁵⁶Ibid, pp. 174-175.

⁵⁷C. E. Krebs, Kanawha Report, W. Va. Geol. Survey, p. 281; 1914.

the sections for Anthony Creek (Mouth), Gilboa, Panther Mountain, and Skyles. So far as known it has not been quarried in the county but it could be used for rough structures where massive masonry is desired.

According to Hennen, in a recently published Report⁵⁸, the Peerless Sandstone has proved to be at the same stratigraphic horizon as the Lower Cedar Grove Sandstone of Hennen and the writer⁵⁹, making it necessary to abandon the latter title as the name of Peerless was first used.

ALMA "A" COAL.

The Alma "A" Coal of Hennen and the writer⁶⁰, named from its occurrence a few feet above the Alma Coal in Logan and Mingo Counties, appears to be almost tótotally absent in Nicholas, the following being the only exposure noted:

Coal Exposure—No. 522 on Map II.

Jefferson District, on hillside north of Twentymile Creek, 2.4 miles S. 63° W. of Harriet; Alma "A" Coal; elevation, 1120' B.

	Ft.	In.
Shale, sandy, wñth iron ore .....	..	..
Coal, slaty	0	6
Fire clay		

ALMA COAL.

The Alma Coal of White⁶¹, named from its occurrence in Mingo County and belonging a short distance below the Peerless Sandstone, is represented in northern Nicholas, principally along the waters of Twentymile Creek, its position being from 150 to 200 feet above the Eagle. As a rule it is hard, splinty and single-bedded, with a thickness of 1½ to 2 feet, but occasionally thickens to three or four feet, when it is usually multiple-bedded, and contains some softer layers. Owing to its great purity it must be classed as a potential commercial coal of the future and its discussion will therefore be taken up in Chapter X, under the subject of "Commercial Coal", where

⁵⁸Ray V. Hennen, Fayette Report, W. Va. Geol. Survey, p. 251, 1919.

⁵⁹Hennen and Reger, Logan and Mingo Report, W. Va. Geol. Survey, p. 175; 1914.

⁶⁰Ibid., pp. 175-176.

⁶¹I. C. White, Vol. II(A), W. Va. Geol. Survey, pp. 404-407; 1908.

its thickness and areal extent, together with detailed bed-sections, chemical quality, and an estimate of its probable tonnage will be presented. Its outcrop is not shown on Map II but its interval of only 40 to 60 feet above the Peerless Bench of the Campbell Creek, the outcrop of which is delineated, will serve to aid in prospecting for it.

MONITOR SANDSTONE.

The **Monitor Sandstone** of Hennen⁶², belonging a few feet below the Alma Coal, and being the same member as the **Logan Sandstone** of Hennen and the writer⁶³, so called from its massive development in the vicinity of Logan, the title "Logan" having been abandoned because of the fact that the same name has been previously used by the Ohio Geological Survey in designating an entirely different stratum, is apparently present at numerous points in Nicholas. It is a massive, gray ledge, with an average thickness of 10 to 20 feet, although in places it assumes larger proportions. In Chapter IV it is noted in the section for Gilboa, Harriet (North), Summersville, and Skyles.

At the **Joseph Alderson Heirs Quarry**, located on the eastern slope of Lonetree Mountain, 0.7 mile west of Summersville, the Monitor Sandstone has been quarried for building purposes, its output having been used for the construction of the Alexander N. Breckenridge residence and for part of the basement of the Nicholas County High School, both in Summersville. A section measured at the quarry face, in descending order, shows the following:

	Feet.
1. Soil	
2. Sandstone, shaly	5
3. Sandstone, massive (2042' B.)	15
4. Concealed	

The sandstone is gray, weathering to brown, medium-coarse, medium-hard, and micaceous, with a tendency to rapid weathering. The quarry is 60 feet long by 30 feet into the

⁶²Ray V. Hennen, Wyoming and McDowell Report, W. Va. Geol. Survey, p. 148; 1915.

⁶³Hennen and Reger, Logan and Mingo Report, W. Va. Geol. Survey, pp. 178-180; 1914.

hill, and it is possible that the full thickness of the ledge is not exposed, as no shale was visible at the base.

LITTLE ALMA COAL.

The **Little Alma Coal** of Hennen and the writer⁶⁴, belonging at the base of the Monitor Sandstone, was observed but seldom in Nicholas, being thin, irregular, and apparently worthless except as an occasional stratigraphic marker, its usual thickness when found being about one and one-half feet. The following exposures were noted:

Coal Exposure—No. 542 on Map II.

On hillside south of Lilly Branch of Twentymile Creek, 1.4 miles S. 72° E. of Vaughan; **Little Alma Coal**; elevation, 930' B.

	Ft.	In.
Sandstone, massive, Monitor .....	..	..
Coal , medium-hard	1	6
Shale, sandy, to creek	2	0

Coal Exposure—No. 543 on Map II.

Jefferson District, on Lilly Branch of Twentymile Creek, 1.4 miles S. 72° E. of Vaughan; **Little Alma Coal**; elevation, 995' B.

	Ft.	In.
Sandstone, massive, Monitor .....	..	..
Coal	1	6
Fire clay and concealed to creek.....	4	0

Coal Exposure—No. 544 on Map II.

Jefferson District, on hillside east of Boardtree Branch of Twentymile Creek, 2.8 miles S. 68° W. of Harriet; **Little Alma Coal**; elevation, 1070' B.

	Ft.	In.
Sandstone, massive, Monitor	11	0
Slate, dark	1	0
Coal	1	4
Shale, concealed, and sandy shale, to Peerless Coal	22	0

The **Lower Monitor Sandstone** of Hennen⁶⁵, coming just below the **Little Alma Coal**, was not observed in Nicholas, having evidently disappeared in the northeastward thinning of the measures.

⁶⁴Ibid., pp. 180-183.

⁶⁵Ray V. Hennen, Fayette Report, W. Va. Geol. Survey, p. 252; 1919.

CAMPBELL CREEK LIMESTONE.

The **Campbell Creek Limestone** of White⁶⁶, named from its occurrence a few feet above the Campbell Creek Coal in the region of the type locality of that seam in Kanawha County, and having the form of lens-shaped concretions, bedded in shale, does not appear to be well represented in Nicholas. In the Fockler Branch of Muddlety Creek Section, page 129, it is recorded as sandy shale, 25 feet thick, containing limestone "turtleback" concretions, coming 17 feet above the Peerless Coal. It was noted again on a branch of Persinger Creek, 1.5 miles north of Nile, on the north slope of Wildcat Knob, being in the form of turtleback concretions, bedded in shale, at an elevation of 2425' B. Elsewhere in the county it was not observed.

CAMPBELL CREEK (PEERLESS BENCH) COAL.

The **Campbell Creek Coal** of White⁶⁷, named from its occurrence on the creek of that name in Kanawha County, is a valuable and persistent member in the stratigraphy of Nicholas. As originally described by Dr. White its character on Campbell Creek is that of a soft, gas coal, of multiple-bedded type, which, when traced southeastward up the Great Kanawha River, splits into two separate and distinct seams, 20 to 30 feet apart, the upper bench being known as the **Peerless** and the lower as the **No. 2 Gas**, both of which have been mined over wide areas in Kanawha, Fayette and other counties. In Nicholas County both seams have been prospected at numerous points, but the Peerless member, owing to its greater purity and fewer number of slate partings, is the more valuable.

The **Peerless Coal**, as it occurs in Nicholas, is soft and gaseous, being usually single-bedded in the northeastern part of the county with a thickness of two to three feet, but having an additional ply of coal at the bottom in the western end of the county, separated from the main bench by a shale part-

⁶⁶I. C. White, Bull. 65, U. S. Geol. Survey, p. 168; 1891; and Vol. II, W. Va. Geol. Survey, p. 566; 1903.

⁶⁷I. C. White, Bull. 65, U. S. Geol. Survey, p. 170; 1891; and Vol. II, W. Va. Geol. Survey, pp. 567-584; 1903.

ing, the total seam often being four feet in thickness. It is mined commercially on a small scale at Vaughan, on Twenty-mile Creek. Its position in the stratigraphic column varies from 100 to 150 feet above the Eagle Coal, and from 450 to 650 feet below the top of the Homewood Sandstone. Its areal extent, character and quality, together with detailed bed-sections and chemical analyses will be presented in Chapter X, under the subject of "Commercial Coal", and on Map II its outcrop is delineated.

CAMPBELL CREEK (NO. 2 GAS BENCH) COAL.

The **No. 2 Gas Bench** of the **Campbell Creek Coal** of White⁶⁸, coming 20 to 50 feet below the Peerless Bench in certain portions of the Great Kanawha Valley, was noted at numerous points in northern and western Nicholas, its thickness and character being such as to classify it as a commercial seam. Its typical appearance in the county is that of a soft, multiple-bedded seam, varying from 2 to 5 feet in thickness, there being two or three partings of soft, gray shale. Its interval below the Peerless Bench varies from 20 to 50 feet and that above the Eagle Coal varies from 50 to 100 feet. Its areal distribution, character, and thickness, together with detailed bed-sections, chemical analyses and an estimate of its available tonnage, will be presented in Chapter X under the subject of "Commercial Coal". Its outcrop is not shown on Map II, but its position at any point may readily be determined from the Peerless and Eagle Coals, both of which are shown on the map.

The **Lower Campbell Creek Sandstone** of Krebs⁶⁹, and the **Lower Campbell Creek Coal** of the same author⁷⁰, both named from their occurrence in Raleigh County, were not observed in Nicholas, having apparently disappeared in the northeastward thinning of the measures.

⁶⁸Loc. cit.

⁶⁹C. E. Krebs, Raleigh Report, W. Va. Geol. Survey, p. 327; 1916.

⁷⁰Ibid., p. 328.

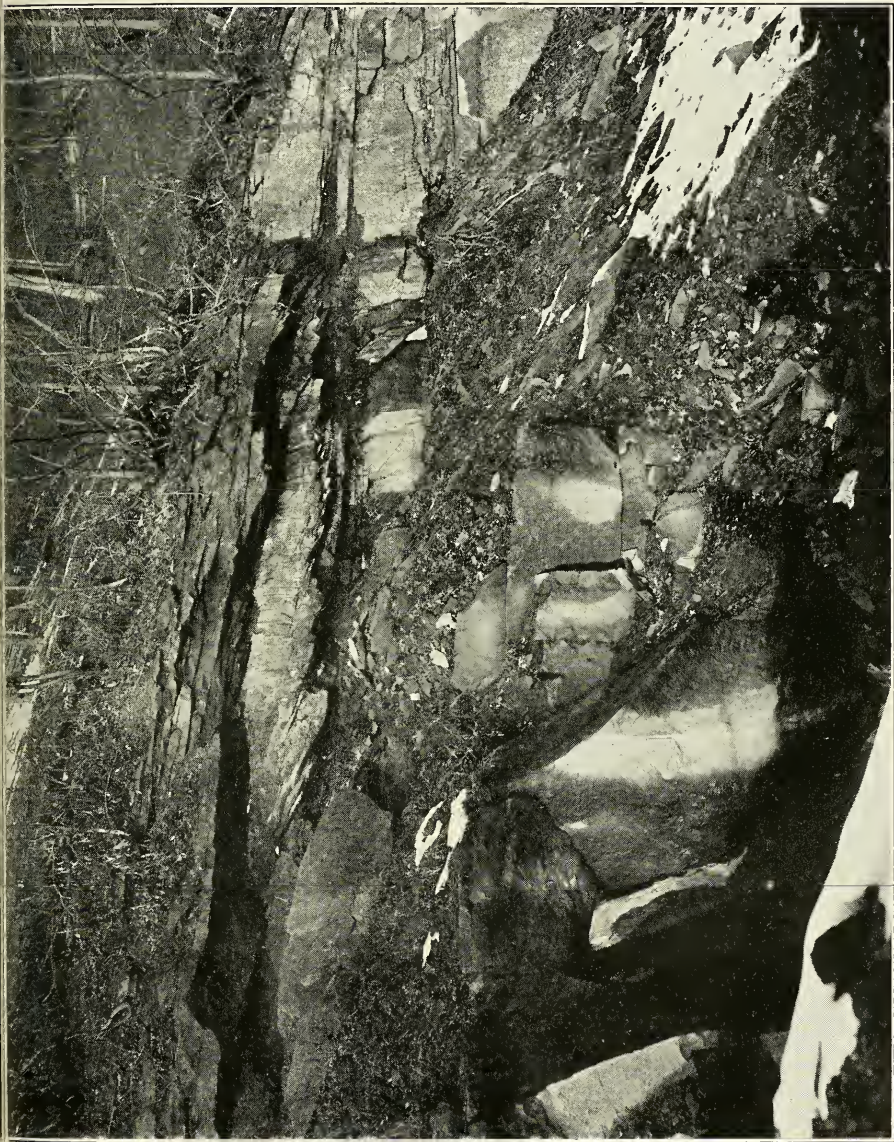


PLATE XI.—Alderson Heirs quarry in Monitor Sandstone at Summersville.
Photo by E. E. Harris.

BROWNSTOWN SANDSTONE.

The **Brownstown Sandstone** of White⁷¹, named from its occurrence at Brownstown, Kanawha County, and there belonging almost immediately under the No. 2 Gas Coal, is a well-defined ledge in northern Nicholas, being hard, gray and massive, and 20 to 40 feet thick. In Chapter IV it is noted in the sections for Anthony Creek (Mouth) and Skyles. In **Jefferson District** it was noted on the south side of Twentymile Creek, 0.3 mile east of Vaughan, at an elevation of 870' B., being 30 feet thick and massive; and on the same side of the same stream, 3 miles northeast of Vaughan, at an elevation of 910' B., being 60 feet thick and massive; and also on the north side of the same stream, 4½ miles northeast of Vaughan, at an elevation of 965' B., being 30 feet thick and massive; also on the hillside west of Little Elk Creek, 3.8 miles northwest of Lockwood, at an elevation of 850' B. In **Hamilton District** it was observed on the north side of Poplar Creek, 3.9 miles southeast of Birch River village, at an elevation of 1300' B., making a massive cliff. So far as known it has not been quarried in the county but its massive, uniform character, and easy accessibility at numerous points along Twentymile and other northern creeks of the county should make it a valuable ledge for use in structures where rough and durable masonry is desired.

The **Powellton "A" Coal** of Hennen and the writer⁷², named from its occurrence in Mingo County where it comes just below the Brownstown Sandstone and a few feet above the Powellton Coal, was not observed in Nicholas, although it seems probable that prospecting might reveal it at a few points in the northern end of the county.

POWELLTON (BROWNSTOWN) COAL.

The **Powellton (Brownstown) Coal** of White⁷³, so named from its occurrence at Powellton, Fayette County, and Browns-

⁷¹I. C. White, Vol. II, W. Va. Geol. Survey, p. 586; 1903.

⁷²Hennen and Reger, Logan and Mingo Report, W. Va. Geol. Survey, p. 192; 1914.

⁷³I. C. White, Vol. II, W. Va. Geol. Survey, pp. 511-512 and 585; 1903; and Vol. II(A), pp. 272 and 349; 1908.

town (now Marmet), Kanawha County, having been mined extensively at these and other points in the Great Kanawha Valley, was observed at several points in northern and western Nicholas, but appears to be too thin, slaty or irregular to be classed as a commercial seam. Its position in the stratigraphic column is from 75 to 100 feet below the Peerless and from 20 to 50 feet above the Eagle Coal, and its character is that of a medium-soft coal, with some splint at the base, being sometimes multiple-bedded, its thickness varying from 1 to 2 feet. The following prospects were observed:

N. D. Backus Coal Prospect—No. 681 on Map II.

Jefferson District, on hillside south of Twentymile Creek, 1.3 miles S. 34° W. of Vaughan; **Powellton Coal**; elevation, 770' B.

	Ft.	In.
Sandstone, shaly .....	..	..
Shale, gray, sandy	5	0
Limestone, siliceous	1	0
Shale, sandy	8	0
Coal, medium-soft	1' 0"	
Coal, hard, splinty.....	0 2	1 2
<hr/>		
Sandstone	0	8
Shale, gray, and concealed to creek.....	15	0
Sandstone	1	2

Coal Exposure—No. 682 on Map II.

Jefferson District, in railroad cut, on west bank of Twentymile Creek, 1.0 mile south of Vaughan; **Powellton Coal**; elevation, 785' B.

	Ft.	In.
Sandstone, massive, Brownstown .....	..	..
Shale, sandy	8	0
Limestone, siliceous.....	1	0
Sandstone	4	0
Shale, gray, sandy	4	0
Coal, soft	1' 0"	
Coal, hard	0 2	1 2
<hr/>		
Sandstone	0	6

Coal Exposure—No. 683 on Map II.

Jefferson District, on hillside north of Twentymile Creek, 4.9 miles N. 64° E. of Vaughan; **Powellton Coal**; elevation, 970' B.

	Ft.	In.
Sandstone, shaly, makes cliff, Brownstown.....	..	..
Shale, dark	2	0
Limestone, siliceous	1	0
Shale, dark	10	0
Fire clay and coal blossom, streak .....	..	..
Shale, sandy	9	0
Coal	1	2
Fire clay shale and concealed to creek	10	0

Lackawanna Coal & Lumber Company Prospect—No. 684 on Map II.

Jefferson District, on hillside west of Little Elk Creek, 1.1 miles N. 68° E. of Swiss; **Powellton Coal**; elevation, 1025' B.
Fallen shut, thickness not determined.

Coal Prospect—No. 685 on Map II.

Jefferson District, on east slope of Coal Hollow of Little Elk Creek, 1.7 miles N. 28° E. of Swiss; **Powellton Coal**; elevation, 1050' B.
Fallen shut, thickness not determined.

Coal Blossom—No. 686 on Map II.

Jefferson District, on south side of Otter Creek, 2.1 miles westward from Lockwood; **Powellton Coal**; elevation, 1455' B.; for stratigraphic position see Lockwood Section, page 117.
Coal blossom, at spring, thickness unknown.

Coal Blossom—No. 687 on Map II.

Jefferson District, on a north branch of Line Creek, 2.6 miles N. 77° W. of Drennen; **Powellton Coal**; elevation, 1195' B.
Coal blossom, at base of sandstone, thickness not determined.

Flynn Lumber Company Coal Exposure—No. 688 on Map II.

Jefferson District, on hill south of Peters Creek, 1.3 miles S. 11° W. of Drennen; **Powellton Coal**; elevation, 1546' B.

	Ft.	In.
Shale, sandy	10	0
Coal, soft	2	8
Fire clay shale, gray	3	6
Shale, sandy, to Eagle Coal	4	0

Coal Prospect—No. 689 on Map II.

Jefferson District, on hillside west of Tate Run of Peters Creek, 0.6 mile N. 77° W. of Drennen; **Powellton Coal**; elevation, 1385' B.
Fallen shut, thickness not determined.

R. K. Harlow Coal Exposure—No. 690 on Map II.

Summersville District, on a short branch of Peters Creek, 1.1 miles northwest of Summersville; **Powellton Coal**; elevation, 1880' B.

	Ft.	In.
Shale, sandy	10	0
Coal	1	2
Shale, sandy, to Eagle Coal	7	0

Coal Exposure—No. 691 on Map II.

Summersville District, on hillside west of Muddlety Creek, 3.1 miles N. 19° E. of Summersville; **Powellton Coal**; elevation, 1855' B.

	Ft.	In.
Shale, dark, sandy	10	0
Coal	0	4
Shale		

Milton J. Groves Prospect—No. 692 on Map II.

Hamilton District, on hillside north of an east branch of Glade Creek, 1.6 miles S. 61° E. of Kirkwood; **Powellton Coal**; elevation, 2050' B.; observation by Price; fallen shut; reported as follows:

	Ft.	In.
Black shale		
Coal	1' 8½"	
Shale	0	1½
Coal	0	8
		2
		6

Coal Blossom—No. 693 on Map II.

Hamilton District, on hillside north of McMillion Creek, 0.9 mile N. 72° W. of Calvin; **Powellton Coal**; elevation, 2180' B.

Coal blossom, thickness not determined.

Coal Prospect—No. 694 on Map II.

Hamilton District, on hillside west of Persinger Creek, 0.7 mile N. 15° E. of Persinger; **Powellton Coal**; elevation, 2240' B.

	Ft.	In.
Sandstone, massive, Brownstown		
Shale	2	0
Coal, slaty at top	1	9
Slate, pavement, and concealed, to Eagle Coal	30	0

Coal Blossom—No. 695 on Map II.

Hamilton District, at source of a southeast branch of Persinger Creek, 0.9 mile N. 74° E. of Persinger; **Powellton Coal**; elevation, 2290' B.; observation by Price.

	Ft.	In.
Coal blossom, reported	2	6

STOCKTON (CANNELTON) LIMESTONE.

The **Stockton (Cannelton) Limestone** of White⁷⁴, named from its occurrence at Cannelton, Kanawha County, where it was once manufactured into cement, being known as the "Stockton" cement bed, and there belonging 35 to 40 feet below the Powellton Coal, appears to be poorly represented in northern Nicholas where its horizon occurs. What seems to represent it is reported on McMillion Creek by Dr. Price, one locality being on the south side of a north branch, 1.9 miles northeast of Kirkwood, where a black shale, 0' 6" thick, containing *Naiadites* fossils, was found at an elevation of 1880' B. At another locality on the south side of the same creek, 2.6 miles eastward from Kirkwood, 4 feet of the same black shale was found at an elevation of 2020' B., the same fossils being found in it, at an interval of 14 feet below the No. 2 Gas Coal.

It is barely possible that the siliceous limestone reported in the roof shales of the Powellton Coal at a few points along Twentymile Creek, as previously described, may be the true Stockton Limestone, but if this be the case the coal classified as the Powellton becomes the Eagle "A", leaving no member whatever to correspond to the Powellton.

The **Matewan Coal** of Hennen and the writer⁷⁵, and the **Matewan Sandstone** of the same authors⁷⁶, were not observed in Nicholas, having apparently disappeared in the northeastward thinning of the measures.

EAGLE "A" COAL.

The **Eagle "A" Coal** of Hennen and the writer⁷⁷, named from its occurrence in Logan and Mingo Counties, and belonging just above the Eagle Sandstone, does not appear to be prominent in Nicholas, the following exposures having been doubtfully correlated with it:

⁷⁴I. C. White, Vol. II, W. Va. Geol. Survey, pp. 511 and 586; 1903.

⁷⁵Hennen and Reger, Logan and Mingo Report, W. Va. Geol. Survey, p. 197; 1914.

⁷⁶Ibid., p. 199.

⁷⁷Ibid., p. 200.

D. McQueen Coal Exposure—No. 696 on Map II.

Hamilton District, on south side of McMillion Creek, 1.2 miles northeast of Kirkwood; Eagle "A" Coal; elevation, 1910' B.; observation by Price.

	Ft.	In.
Shale .....		..
Coal	0	11
Shale, gray		
"Mrs. McQueen reports this coal as 1' 10" thick in an auger hole."		

Coal Prospect—No. 697 on Map II.

Hamilton District, on hillside north of McMillion Creek, 1.8 miles N. 52° E. of Kirkwood; Eagle "A" Coal; elevation, 1865' B.; observation by Price.

	Ft.	In.
Coal, reported by D. H. Pletcher.....	0	6

K. B. McCue Coal Exposure—No. 698 on Map II.

Hamilton District, on a short branch of McMillion Creek, 2.4 miles northwest of Calvin; Eagle "A" Coal; elevation, 2027' B.; observation by Price.

	Ft.	In.
Shale and concealed, from No. 2 Gas Coal	14	0
Shale, with fossils, Stockton Limestone	4	0
Coal	0	5

EAGLE SANDSTONE.

The Eagle Sandstone of Hennen and the writer⁷⁸, named from the vicinity of Man, Logan County, and coming a few feet above the Eagle Coal, is a well-defined horizon in Nicholas, being usually gray and massive, but sometimes shaly, and having an average thickness of 10 to 20 feet, but sometimes developing local lenses of 50 feet or more. In Chapter IV it is noted in the sections for Camden-on-Gauley, Lockwood, Panther Mountain, Skyles, Summersville, and Swiss. Numerous exposures were noted in connection with the Eagle Coal and their thickness and character will be recorded in the detailed bed-sections of the latter member, published in Chapter X. So far as known the Eagle Sandstone has not been quarried in the county but its character at various localities is such that it could be used for massive masonry if so desired.

⁷⁸Ibid., pp. 62 and 202.

NEWLON LIMESTONE AND SHALE.

The **Newlon Limestone and Shale** of the writer⁷⁹, named from its occurrence at Newlon, Upshur County, where it is a black, fissile shale, carrying large limestone concretions of the well-known "turtleback" type, and coming just above the horizon of the Eagle Coal, extends through Nicholas in good development. In Chapter IV it is recorded in the section for Tipton, being 10 feet thick, and in Chapter X, under the detailed bed-sections of the Eagle Coal, will be found numerous details of its occurrence.

EAGLE COAL.

The **Eagle Coal** of White⁸⁰, named for its occurrence at Eagle Station, Fayette County, where it was first mined and named under this title by Mr. Weyant, and was also given the trade name of "No. 1 Gas", because of its soft, coking character, is a bed of wide distribution and general prevalence in northern and western Nicholas where its horizon is found. It varies from 2 to 5 feet in thickness and usually has a soft and gaseous character, with occasional streaks of harder coal, and is featured by a dark slate or bony parting, several inches thick, coming about one foot from the top, that makes it easy of recognition but detracts somewhat from its value as a minable seam. It has been used as the key rock for the green structure contours shown for northern Nicholas on Map II, and its outcrop is shown on the same sheet. In Chapter X its character, areal extent, and tonnage will be discussed, together with many detailed bed-sections and chemical analyses. It is being mined commercially on Twentymile Creek.

The **Bens Creek Sandstone** of Hennen and the writer⁸¹, and the **Bens Creek Coal** of the same authors⁸², both named from their occurrence in southern Mingo County, were not observed in Nicholas, having apparently disappeared in the northeastward thinning of the measures.

⁷⁹D. B. Reger, Barbour, Upshur and Western Portion of Randolph Report, W. Va. Geol. Survey, pp. 281-282; 1918.

⁸⁰I. C. White, Bull. 65, U. S. Geol. Survey, p. 140; 1891; and Vol. II, W. Va. Geol. Survey, p. 587; 1903.

⁸¹Hennen and Reger, Logan and Mingo Report, W. Va. Geol. Survey, pp. 204-205; 1914.

⁸²Ibid., pp. 205-206.

DECOTA SANDSTONE.

The **Decota Sandstone** of Krebs⁸³, named from its occurrence along Cabin Creek, Kanawha County, where it belongs in the interval separating the Eagle and Little Eagle Coals, is a well-developed stratum in northern Nicholas, being a hard, gray, massive ledge, often making cliffs, 10 to 40 feet in thickness. In Chapter IV it is noted in the sections for Burl, Deepwell (Southeast), Fury Knob, Persinger Ford, Tipton, Skyles, and Swiss. Other exposures are noted in Chapter X under the description of the Little Eagle Coal. So far as known it has not been quarried in the county but its durable character and easy accessibility over considerable areas would make it well adapted for structures where massive masonry is desired.

LITTLE EAGLE COAL.

The **Little Eagle Coal** of White⁸⁴, named from its occurrence at Eagle Station, Fayette County, where it belongs 20 to 30 feet below the Eagle Coal and 75 to 80 feet above the fossiliferous Eagle Limestone and Shale, is a persistent stratum in Nicholas, being found 30 to 50 feet below the Eagle Coal, and attaining minable thickness and purity in the western end of the county. It is usually soft, gaseous, and single-bedded, varying from 1 to 2½ feet in thickness. Its areal extent, character and thickness, together with detailed bed-sections and an estimate of its probable tonnage will be presented in Chapter X, under the subject of "Commercial Coal".

CEDAR COAL.

The **Cedar Coal** of Hennen and the writer⁸⁵, named from its occurrence in southern Mingo County, and lying a few feet below the Little Eagle Coal, appears to be of little im-

⁸³C. E. Krebs, Kanawha Report, W. Va. Geol. Survey, p. 292; 1914.

⁸⁴I. C. White, Bull. 65, U. S. Geol. Survey, p. 177; 1891; and Vol. II, W. Va. Geol. Survey, pp. 592-593; 1903.

⁸⁵Hennen and Reger, Logan and Mingo Report, W. Va. Geol. Survey, p. 210; 1914.

portance in Nicholas, being usually less than one foot in thickness, and often entirely absent from the measures. The following exposures were noted:

Coal Blossom—No. 885 on Map II.

Summersville District, in ridge road east of Muddlety Creek, 2.9 miles N. 57° E. of Summersville; **Cedar Coal**; elevation, 2080' B.
Coal blossom, thickness not determined.

Coal Blossom—No. 886 on Map II.

Summersville District, in ridge road east of Muddlety Creek, 2.9 miles N. 57° E. of Summersville; **Cedar Coal**; elevation, 2080' B.

	Ft.	In.
Shale, sandy.....	..	..
Coal	0	5
Shale		

Coal Blossom—No. 887 on Map II.

Summersville District, on hillside south of Duffy Branch of Muddlety Creek, 2.0 miles N. 26° E. of Summersville; **Cedar Coal**; elevation, 1853' L.

Coal, streak only.

GRAPEVINE SANDSTONE.

The **Grapevine Sandstone** of Hennen and the writer⁸⁶, named from its occurrence in southern Mingo County, was not definitely identified within the limits of Nicholas, its place being usually occupied by shale, but in the section for Dogway, page 160, a 35-foot ledge was doubtfully ascribed to its horizon, the locality named being in Webster just east of the extreme eastern end of Nicholas County.

EAGLE LIMESTONE AND SHALE.

The **Eagle Limestone and Shale** of White⁸⁷, named from their occurrence at Eagle, Fayette County, where they are 90 to 100 feet below the Eagle Coal and 75 to 80 feet below the

⁸⁶Ibid., p. 211.

⁸⁷I. C. White, Bull. 65, U. S. Geol. Survey, pp. 140 and 177; 1891; and Vol. II, W. Va. Geol. Survey, p. 593; 1903.

Little Eagle, and where they contain marine fossils in profusion, are well represented in Nicholas. The typical character of this stratigraphic stage in the county is that of a dark, argillaceous and fissile shale, 10 to 30 feet thick, containing, at various points, a dark, siliceous, lenticular limestone, interbedded in the shale. Marine fossils are frequently found in abundance both in the limestone and in the shale. In Chapter IV they are recorded in the sections for Beaver, Beech Fork of Lilly, Burl, Camden-on-Gauley, Deepwell (Southeast), Fury Knob, Gilboa, Lockwood, Panther Mountain, Summersville, and Tipton.

In **Jefferson District**, the shale, with occasional lenses of the limestone, is above drainage over a restricted area near the mouth of Twentymile Creek, and also at the mouth of Hardway Branch of the same stream at the point where the Mann Mountain Anticline crosses the creek; also along Gauley River from Belva eastward to the district line, being well up against the mountainside; also on Little Elk, Otter, and Peters Creeks. In **Grant District**, it is visible at numerous points on Peters Creek and various of its tributaries from both the north and south. In **Summersville District**, it crops on Peters Creek, Muddlety Creek, and at various points in the plateau lands southward toward Gauley.

A typical section, measured with aneroid in the public road on Peters Creek, 1 mile northwest of Summersville, and arranged in descending order, exhibits the following:

			Ft.	In.
1. Shale, dark, visible.....	10' 0"	} Eagle Shale	20	4
2. Sandstone, fossiliferous (1795' B.).....	0 4			
3. Shale, dark	10 0			
4. Sandstone, shaly			5	0
5. Fire clay, streak, Lower War Eagle Coal horizon ..			..	..
6. Shale, sandy,			15	0
7. Sandstone, Lower Gilbert, visible			10	0

A sample (No. 357R) was collected from Nos. 1 and 3 of section, the composition of which is reported as follows by Messrs. Hite and Krak, the deposit being on the Harlow farm:

	Per cent.
Silica (SiO ₂)	54.28
Ferric Iron (Fe ₂ O ₃)	6.87
Alumina (Al ₂ O ₃)	23.04
Lime (CaO).....	1.41
Magnesia (MgO)	1.01
Potassium (K ₂ O)	2.41
Sodium (Na ₂ O)	0.95
Titanium (Ti ₂ O).....	0.02
Phosphoric Acid (P ₂ O ₅)	Trace
Moisture	2.12
Loss on ignition	8.21
	<hr/>
Total.....	100.32

In **Hamilton District**, its main exposure is along Persinger Creek and along the Summersville and Slaven Cabin Road. In **Beaver District**, it is exposed along the road mentioned above, as well as in some of the plateau lands farther south, and its crop extends up Beaver Creek nearly to the mouth of Hannah Run below Delphi. In **Richwood District**, it was not observed, being apparently above the top of the mountains at nearly if not all points. In **Kentucky District**, it is present in a high range of hills between Canvas and the Gauley River. In **Wilderness District**, it was not observed, its horizon being mainly if not altogether above the tops of the ridges.

Several large collections of marine fossils from the limestone and shale were made at various points in the county by Dr. Price and the writer, these being described in detail by the former in Chapter XIII.

LITTLE CEDAR COAL.

The **Little Cedar Coal** of Hennen and the writer⁸⁸, named from its occurrence at Cedar, Mingo County, where it comes just below the Eagle Limestone and Shale, appears to have disappeared almost entirely from the measures in Nicholas County, being represented usually by only a little black slate or slaty coal, and being of no value except as an occasional stratigraphic marker. It is doubtfully identified in the section for Camden-on-Gauley, page 153, the exposure being in Webster County, a few miles east of the Nicholas Line.

⁸⁸Hennen and Reger, Logan and Mingo Report, W. Va. Geol. Survey, p. 215; 1914.

LOWER WAR EAGLE SANDSTONE.

The **Lower War Eagle Sandstone** of Hennen and the writer⁸⁹, named from its occurrence in southeastern Mingo County, where it comes between the Little Cedar and Lower War Eagle Coals, is apparently represented in Nicholas by a somewhat insignificant ledge, often shaly or flaggy, but sometimes massive, its thickness varying from 5 to 15 feet. In Chapter IV it is noted in the sections for Beaver, Camden-on-Gauley, and Panther Mountain.

LOWER WAR EAGLE COAL.

The **Lower War Eagle Coal** of White⁹⁰, named from its occurrence in southeastern Mingo County, where it comes only a few feet below the Lower War Eagle Sandstone, and about 250 feet below what is now known to be the Eagle Coal, was identified at various points in Nicholas but appears to be of little value. In this county it is a soft, gaseous coal, varying from 1 to 2 feet in thickness, being often slaty and multiple-bedded, so that it is unfit for mining. Its interval below the Eagle Coal varies from 110 to 150 feet and it is usually only a few feet above the massive Lower Gilbert Sandstone ledge, except in certain localities where the lenticular Upper Gilbert intervenes. The following exposures were noted:

Coal Blossom—No. 889 on Map II.

Jefferson District, in road along hillside north of Gauley River, 1.3 miles south of Lockwood; **Lower War Eagle Coal**; elevation, 1320' B.

	Ft.	In.
Coal blossom, visible	1	0
(Reported 3' 0" by Newman Summers).		

Coal Blossom—No. 890 on Map II.

Jefferson District, in road along hillside north of Peters Creek, 0.6 mile N. 71° E. of Lockwood; **Lower War Eagle Coal**; elevation, 1110' B.

⁸⁹Ibid., p. 216.

⁹⁰I. C. White, Vol. II(A), W. Va. Geol. Survey, pp. 318 and 325; 1908.

	Ft.	In.
Coal blossom, at spring, reported	2	6

Coal Blossom—No. 891 on Map II.

Jefferson District, in road along hillside north of Peters Creek, 0.4 mile S. 77° W. of Drennen; Lower War Eagle Coal; elevation, 1245' B.

Coal blossom, thickness not determined.

Coal Exposure—No. 892 on Map II.

Jefferson District, on a south branch of Peters Creek, 1.0 mile S. 67° W. of Tipton; Lower War Eagle Coal; elevation, 1445' B.

	Ft.	In.
Sandstone, shaly, Lower War Eagle	5	0
Coal	1'	0"
Shale, sandy	0	8
Coal	0	2
Concealed to sandstone	5	0

Coal Blossom—No. 893 on Map II.

Jefferson District, in road, on a short branch of Gauley River, 1.0 mile N. 21° E. of Vinton; Lower War Eagle Coal; elevation, 1555' B.; for stratigraphic position see Panther Mountain Section, page 119.

Coal blossom, thickness not determined.

Coal Exposure—No. 894 on Map II.

Grant District, on an east branch of Peters Creek, 2.3 miles N. 48° E. of Drennen; Lower War Eagle Coal; elevation, 1280' B.

	Ft.	In.
Sandstone, massive, Lower War Eagle.....	..	..
Shale, dark	4	0
Coal	1	0
Shale, dark, sandy	15	0

Coal Blossom—No. 895 on Map II.

Summersville District, on hillside east of Buckgarden Creek, 0.6 mile N. 60° E. of Gilboa; Lower War Eagle Coal; elevation, 1520' B.

Coal, streak.

Coal Blossom—No. 896 on Map II.

Summersville District, on hillside east of Buckgarden Creek, 0.7 mile N. 49° E. of Gilboa; Lower War Eagle Coal; elevation, 1515' B.

Coal, streak.

Coal Blossom—No. 897 on Map II.

Summersville District, on hillside east of Buckgarden Creek, 1.2 miles N. 41° E. of Gilboa; **Lower War Eagle Coal**; elevation, 1500' B. Coal blossom, thickness not determined.

Coal Exposure—No. 898 on Map II.

Summersville District, in road along hillside north of Peters Creek, 1.5 miles N. 40° W. of Summersville; **Lower War Eagle Coal**; elevation, 1720' B.

	Ft.	In.
Black slate and coal	1	0

Coal Prospect—No. 899 on Map II.

Summersville District, on hillside south of Peters Creek, 0.4 mile west of Summersville; **Lower War Eagle Coal**; elevation, 1857' B.; for stratigraphic position see Summersville Section, page 127.

	Ft.	In.
Slate, black, coaly	2	0

Coal Blossom—No. 900 on Map II.

Summersville District, on hillside west of Arbuckle Branch of Muddlety Creek, 1.0 mile S. 23° W. of Summersville; **Lower War Eagle Coal**; elevation, 1930' B.
Coal, streak.

Coal Exposure—No. 901 on Map II.

Summersville District, on road, 1.0 mile S. 29° E. of Summersville; **Lower War Eagle Coal**; elevation, 1990' B.

	Ft.	In.
Shale, gray .....	..	..
Coal, slaty	1	0
Sandstone, massive .....	..	..

Coal Exposure—No. 902 on Map II.

Summersville District, on road, 0.7 mile S. 45° E. of Summersville; **Lower War Eagle Coal**; elevation, 1950' B.

	Ft.	In.
Coal, slaty	1	0

Coal Exposure—No. 903 on Map II.

Summersville District, on road, 0.6 mile S. 31° E. of Summersville; **Lower War Eagle Coal**; elevation, 1950' B.

	Ft.	In.
Coal, slaty	1	8

Coal Blossom—No. 904 on Map II.

Summersville District, in road, 0.6 mile N. 70° E. of Summersville; **Lower War Eagle Coal**; elevation, 1890' B.
Coal blossom, thickness not determined.

Coal Exposure—No. 905 on Map II.

Summersville District, in road, 1.0 mile N. 48° E. of Summersville; **Lower War Eagle Coal**; elevation, 1910' B.

	Ft.	In.
Shale, dark, Eagle .....	..	..
Coal	0	2
Slate, pavement		

Coal Blossom—No. 906 on Map II.

Hamilton District, on hillside south of Ewing Run of Glade Creek, 2.1 miles S. 80° W. of Persinger; **Lower War Eagle Coal**; elevation, 2025' B.; observation by Price.

	Ft.	In.
Coal digging, blossom	0	6

Coal Blossom—No. 907 on Map II.

Hamilton District, in road along hillside east of Persinger Creek, 0.3 mile N. 30° E. of Persinger; **Lower War Eagle Coal**; elevation, 2030' B.; observation by Price.

Coal blossom, at run level, thickness not determined.

Coal Blossom—No. 908 on Map II.

Beaver District, in ridge road, north of Gauley River, 1.8 miles N. 82° W. of Curtin; **Lower War Eagle Coal**; elevation, 2415' B.

	Ft.	In.
Coal blossom	0	6

Coal Blossom—No. 909 on Map II.

Beaver District, in ridge road, 1.9 miles southeast of Cranberry; **Lower War Eagle Coal**; elevation, 2810' B.

Coal blossom, thickness not determined.

Coal Blossom—No. 910 on Map II.

Beaver District, in ridge road, 2.2 miles southeast of Cranberry; **Lower War Eagle Coal**; elevation, 2855' B.

Coal blossom, thickness not determined.

Coal Blossom—No. 911 on Map II.

Kentucky District, along road south of Gauley River and 0.6 mile

south of Persinger Ford; **Lower War Eagle Coal**; elevation, 2165' B.; for stratigraphic position see Persinger Ford (South) Section, page 164.
Coal blossom, thickness not determined.

Coal Stripping—No. 912 on Map II.

Kentucky District, on hillside south of Gauley River, 1.1 miles N. 34° W. of Canvas; **Lower War Eagle Coal**; elevation, 2135' B.

	Ft.	In.
Fallen shut, coal, reported, 0' 8" to.....	0	10

Coal Blossom—No. 913 on Map II.

Kentucky District, in ridge road, 1.1 miles N. 31° W. of Deepwell; **Lower War Eagle Coal**; elevation, 2275' B.; for stratigraphic position, see Deepwell (Northwest) Section, page 167.

Coal blossom, thickness not determined.

Coal Blossom—No. 914 on Map II.

Kentucky District, in road north of Jims Creek, 1.0 mile S. 76° E. of Deepwell; **Lower War Eagle Coal**; elevation, 2520' B.; for stratigraphic position see Deepwell (Southeast) Section, page 169.

Coal blossom, thickness not determined.

Coal Blossom—No. 915 on Map II.

Kentucky District, on north slope of Fury Knob, 1¼ miles south-east of Deepwell; **Lower War Eagle Coal**; elevation, 2490' B.

Coal blossom, at spring, thickness not determined.

Coal Exposure—No. 916 on Map II.

Wilderness District, in ridge road, 1.6 miles N. 75° W. of Hominy Falls; **Lower War Eagle Coal**; elevation, 2905' B.

	Ft.	In.
Shale, sandy, dark, shell fragments? Eagle.....	..	..
Coal	1	6
Fire clay shale.....	5	0

UPPER GILBERT SANDSTONE.

The **Upper Gilbert Sandstone** of Hennen and the writer⁹¹, named from its occurrence near the town of Gilbert, Mingo County, and belonging a few feet below the Lower War Eagle Coal, appears to be absent from the measures at most points in Nicholas. In Chapter IV it is recorded in the sections for

⁹¹Hennen and Reger, Logan and Mingo Report, W. Va. Geol. Survey, pp. 217-218; 1914.

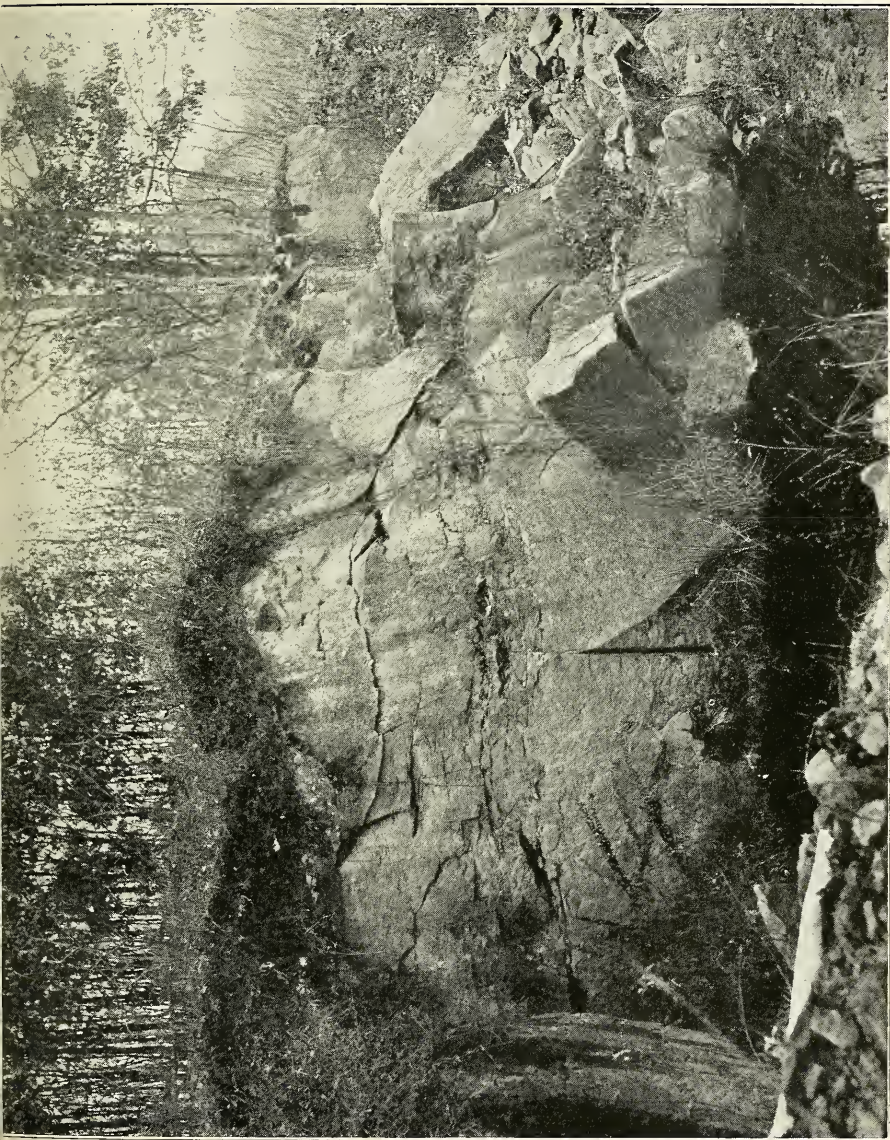


PLATE XII.—A. J. Hereford quarry in Lower Gilbert Sandstone at Summersville.
Photo by E. E. Harris.

Beaver, Beech Fork of Lilly, and Panther Mountain, and it was also noted on the hillside north of Rockcamp Branch of Peters Creek, 0.9 mile southwest of Enon, its top having an elevation of 1550' B. Elsewhere in the county it was not identified.

The **Oceana Limestone** of Hennen⁹², belonging in the shales below the Upper Gilbert Sandstone, and the **Glenalum Tunnel Coal** of Hennen and the writer⁹³, named from its occurrence in southeastern Mingo County, and belonging a few feet above the Lower Gilbert Sandstone, were not observed in Nicholas, having apparently disappeared in the northeastward thinning of the measures.

LOWER GILBERT SANDSTONE.

The **Lower Gilbert Sandstone** of Hennen and the writer⁹⁴, named from its exposure along the Guyandot River at Gilbert, Mingo County, where it is a massive cliff rock, preserves this character across several counties northeast of its type locality and in Nicholas still remains one of the most conspicuous ledges in the Kanawha Group. As exposed therein it is a massive, coarse-grained stratum, gray or light-brown in color, very hard and resistant to erosion, often making great cliffs, and varying in thickness from 30 to 60 feet, its top coming at an interval of 150 to 225 feet below the Eagle Coal. In Chapter IV it is recorded in the sections for Beech Fork of Lilly, Burl, Camden-on-Gauley, Cranberry (West), Cranberry (Southeast), Deepwell (Northwest), Deepwell (Southeast), Fenwick, Fury Knob, Gilboa, Hominy Ford, Lowland, Muddlety Creek, Persinger Ford (North), Persinger Ford (South), Summersville and Swiss.

In **Jefferson District**, it is exposed for a mile or more up Twentymile Creek from the mouth, along the Gauley River eastward to the district line, and along Peters Creek and some of its tributaries from its mouth northeastward to the

⁹²Ray V. Hennen, Wyoming and McDowell Report, W. Va. Geol. Survey, pp. 164-165; 1915.

⁹³Hennen and Reger, Logan and Mingo Report, W. Va. Geol. Survey, pp. 218-219; 1914.

⁹⁴Ibid., p. 219.

district line. In **Grant District**, it is visible along Peters Creek and tributaries and on the Gauley River and tributaries. In **Summersville District**, it is exposed along Peters Creek to its head at Summersville, the town being mainly built on the plateau which it forms, and along Gauley River and tributaries, and on Muddlety Creek, going under drainage between Duffy Branch and the Hamilton District Line. In **Hamilton District**, it is high up on the ridges along the Gauley front and crops along Persinger Creek from its mouth to a point about one-half mile above Persinger village. In **Beaver District**, it crops along Beaver Creek from its mouth up nearly to the mouth of Little Beaver, along Rockcamp Run, and Strouds Creek, and in the plateau lands on either side of Gauley, being well up toward the tops of the mountains in the region southeast of the river. In **Richwood District**, it is above the summit of the mountains at most localities, being found only in the tops of some of the higher points. In **Kentucky and Wilderness Districts**, its position is above the general level of the plateau, its outcrop making conspicuous ledges in several of the monadnocks that rise to a greater height.

A very noticeable region of the Lower Gilbert outcrop is along the Summersville and Slaven Cabin Road, between Camden-on-Gauley and Summersville, the road being mainly built along its top, except where the highway crosses a few transverse ridges that rise to a higher level or descends into the gorges of Persinger and Muddlety Creeks. In this region the sandstone, in conjunction with other heavy ledges below it, has exerted a profound influence on the topography, its dip being northwestward, contrary to the drainage channels of the major tributaries of Gauley, so that numerous extensive glades and wide creek valleys have been preserved from erosion by its highly resistant nature, a great amount of fertile, alluvial soil being thus preserved for agricultural purposes.

At the **Andrew B. Hereford Quarry**, located 0.6 mile northeastward from Summersville and 0.1 mile south of the Summersville and Slaven Cabin Road, the Lower Gilbert has been quarried for building purposes, having been used for portions of the basement of the Nicholas County High School.

Apparently only the middle portion of the ledge has been used, the top of the stratum being at 1930' B., the top of the quarry at 1920' B., and the base of the same at 1905' B. The quarry is 15 feet high by 60 feet long and extends 20 feet into the hill. The stone is very coarse and massive, medium-hard, light-buff in color on fresh fracture, weathering to a pale-pink, the cleavage and joint-planes being somewhat irregular.

The **A. J. Hereford Quarry** is located 0.6 mile east of Summersville and 0.2 mile south of the Summersville and Slaven Cabin Road, stone from this locality having been used in the construction of the Nicholas County Court-House. The quarry is 75 feet long by 10 feet deep into the hill, only the upper 10 feet of the ledge being used, its top having an elevation of 1915' B. The stone is similar in its appearance to that described in the last quarry above, there being several smaller openings on the same property in addition to the large quarry.

At the **Edward Alderson Quarry**, located 0.4 mile east of Summersville, the same stone has been quarried from loose boulders, which are well weathered to a pale-pink color, with occasional iron bands that give a more reddish tinge. Stone from this locality was used for portions of the Farmers and Merchants Bank Building at Summersville, the elevation of the outcrop being about 1895' B.

At the **A. J. Horan Quarry**, located 0.3 mile southeast of Summersville, the same stone has been worked, its top being at 1910' B., only 10 feet of the upper portion, besides loose boulders, being used. Stone from this locality was used in portions of the basement of the Nicholas County High School, its general characteristics being the same as those noted for other quarries described above.

At the **Alderson and Walker Quarry**, located 0.2 mile southeast of Summersville, there is 30 feet of the Lower Gilbert exposed, its base having an elevation of 1960' B., the lower 15 feet of the ledge being quarried, and the face of the opening being 75 feet long by 15 feet into the hill. The stone is a pinkish color, with occasional dark, ferruginous bands, $\frac{1}{4}$ to $\frac{1}{2}$ inch in width, the product having been used for local building purposes in Summersville.

Concerning the future of the Lower Gilbert as a building stone, the opinion may be stated that it is apparently the best member of the Kanawha Group in the county, its durability, working quality, and architectural character all being considered. Its prevailing buff or pink color is most pleasing to the eye, and it seems probable that, in the event of extensive coal or other industrial development in the region of the outcrop of the ledge, its employment for structural purposes, both architectural and otherwise, would be entirely safe and satisfactory.

The **Gilbert "A" Coal** of Hennen⁹⁵, named from its occurrence in McDowell County, where it comes just under the Lower Gilbert Sandstone, was not observed in Nicholas, having apparently disappeared in the northeastward thinning of the measures.

GILBERT SHALE.

The **Gilbert Shale** of Hennen⁹³, named from its occurrence in western Wyoming County, where it comes just under the Lower Gilbert Sandstone and contains fossils largely of a marine character, is a fairly regular member in the stratigraphy of Jefferson District, but eastward from that region does not appear to be prominent. In Chapter IV it is recorded in the section for Swiss as being 50 feet thick, and carrying marine fossils, its character being that of a dark, fissile shale. It is visible in the bluffs along Gauley westward from Swiss toward Belva, and east of Swiss it outcrops for a short distance along Little Elk Creek. On Otter Creek just west of Lockwood it contains fossils along the highway at an elevation of 1050' B.

In a recent Report by Hennen⁹⁷, the belief is stated that the **Dorothy Limestone** of Krebs⁹⁸ correlates with the Gilbert Shale, instead of with the Oceana Limestone as previously supposed, a similarity of fossil types as well as stratigraphic evidence forming the basis of this conclusion.

⁹⁵Ray V. Hennen, Wyoming and McDowell Report, W. Va. Geol. Survey, p. 167; 1915.

⁹⁶Ibid., p. 168.

⁹⁷Ray V. Hennen, Fayette Report, W. Va. Geol. Survey, p. 270; 1919.

⁹⁸C. E. Krebs, Raleigh Report, W. Va. Geol. Survey, p. 353; 1916.

GILBERT COAL.

The **Gilbert Coal** of Hennen and the writer⁹⁹, named from its occurrence on the Guyandot River at the town of Gilbert, Mingo County, is present generally throughout Nicholas in the regions where its horizon occurs. As a rule it is soft and columnar in character, being multiple-bedded and varying in thickness from 2 to 5 feet, coming 200 to 275 feet below the Eagle Coal. Its areal extent, character, and quality, together with a description of numerous prospects and openings, and an estimate of its available tonnage will be discussed in Chapter X, under the subject of "Commercial Coal". It is best developed in the vicinity of Keslers Crosslanes and Sparks where it has long been mined for local domestic use. Its outcrop is delineated on Map II for those regions in which it is known or believed to be of minable thickness and purity.

DOTSON SANDSTONE.

The **Dotson Sandstone** of Campbell¹⁰⁰, named from its occurrence at Wyoming Station (formerly Dotson), Mingo County, is present in general development throughout Nicholas in those regions where its horizon belongs. As a rule it is a hard, gray or light-brown, coarse stratum, with occasional quartz pebbles, being 20 to 40 feet thick, and frequently forming cliffs. Its position is only a few feet below the Gilbert Coal and may readily be determined at any point from the outcrop of that stratum, its general region of outcrop closely following that of the Lower Gilbert which has already been outlined on pages 289-290. In Chapter IV it is recorded in the sections for Beaver, Camden-on-Gauley, Chapman School, Deepwell (Northwest), Fury Knob, Cranberry (West), Gilboa, Muddlety Creek, Panther Mountain, Swiss, and Tipton.

At the **A. J. Trent Quarry**, located on the south side of Arbuckle Branch of Muddlety Creek, 0.4 mile southeast of Summersville, the Dotson has been quarried for building purposes, having been used in the construction of the resi-

⁹⁹Hennen and Reger, Logan and Mingo Report, W. Va. Geol. Survey, pp. 221-222; 1914.

¹⁰⁰M. R. Campbell, Tazewell Folio, No. 44, U. S. Geol. Survey; 1898.

dences of Paris Herold, C. E. Myers and the Farmers and Merchants Bank Building, and also in a portion of the basement of the Nicholas County High School, all in Summersville. As exposed at this quarry the stone is hard, very coarse, with a few small quartz pebbles, gray in color and weathering to buff, and having occasional brown streaks that show a larger percentage of iron. Its top has an elevation of 1850' B., only 10 feet of the upper portion being quarried, much of the stone being obtained from large boulders that lie on the ground. The texture of the stone, as exposed in these buildings, is very pleasing in its effect and the same ledge could doubtless be quarried at numerous points in the county with satisfactory results.

DOUGLAS "A" COAL.

The Douglas "A" Coal of Hennen¹⁰¹, named from its occurrence in southern McDowell County, where it comes just beneath the Dotson Sandstone, was seldom observed in Nicholas, being represented only by an occasional streak, and being too thin and irregular to be of any value. It is noted in connection with the Douglas Coal at Coal Exposure No. 994 on a following page.

DOUGLAS COAL.

The Douglas Coal of Hennen¹⁰², named from its occurrence at the town of Douglas, McDowell County, where it comes 10 to 15 feet below the Dotson Sandstone, has little value in Nicholas, although it is generally present in those regions where its horizon is above drainage. Its position in the stratigraphic column is almost immediately below the Dotson Sandstone, 50 to 75 feet below the Gilbert Coal, and from 300 to 350 feet below the Eagle Coal. It is soft and columnar in its appearance, usually slaty, single-bedded, and less than one foot thick, but occasionally splits into two benches, separated by three or four feet of shale. The following exposures were noted:

¹⁰¹Ray V. Hennen, Wyoming and McDowell Report, W. Va. Geol. Survey, p. 181; 1915.

¹⁰²Ibid., pp. 181-182.

Coal Exposure—No. 991 on Map II.

Jefferson District, on north bank of Gauley River at Swiss; **Douglas Coal**; elevation, 690' B.; for stratigraphic position see Swiss Section, page 116.

	Ft.	In.
Coal, reported	0	10

Coal Exposure—No. 992 on Map II.

Jefferson District, on north bank of Gauley River, 0.8 mile S. 36° E. of Swiss; **Douglas Coal**; elevation, 735' B.

	Ft.	In.
Sandstone, massive, Dotson .....	..	..
Coal	1	0
Fire clay shale .....	..	..

Coal Exposure—No. 993 on Map II.

Jefferson District, on hillside north of Gauley River, 1.0 mile S. 44° E. of Swiss; **Douglas Coal**; elevation, 765' B.

	Ft.	In.
Sandstone, massive, Dotson .....	..	..
Coal , slaty	1'	4"
Slate, dark	0	2
Coal	0	5
Slate, dark	0	3
Coal	0	10
Shale and concealed to Lower Dotson Sandstone	5	0

Coal Exposure—No. 994 on Map II.

Jefferson District, on west side of Peters Creek, 1.2 miles N. 60° E. of Lockwood; **Douglas Coal**; elevation, 1090' B.

	Ft.	In.
Sandstone, massive, Dotson	75	0
Shale, sandy, coal streaks.....	2	0
Coal , Douglas "A"	0	10
Sandstone, massive	15	0
Shale, sandy	5	0
Coal , Douglas	0	6
Concealed to creek	10	0

Coal Exposure—No. 995 on Map II.

Jefferson District, on west side of Peters Creek, 1.3 miles N. 60° E. of Lockwood; **Douglas Coal**; elevation, 1100' B.

	Ft.	In.
Sandstone, massive, Dotson

	Ft.	In.
Shale, sandy	4	0
Coal	0	6
Shale, dark, with ferruginous limestone nodules.....	20	0

Coal Blossom—No. 996 on Map II.

Jefferson District, along road on hillside north of Gauley River, 1.9 miles northwest of Albion; **Douglas Coal**; elevation, 1260' B.
Coal blossom, thickness not determined.

Coal Blossom—No. 997 on Map II.

Jefferson District, along road on hillside east of Gauley River, 1.3 miles northwest of Albion; **Douglas Coal**; elevation, 1235' B.
Coal blossom, thickness not determined.

Coal Prospect—No. 998 on Map II.

Jefferson District, along road, on hillside east of Gauley River, 0.2 mile N. 45° W. of Albion; **Douglas Coal**; elevation, 1410' B.
 Fallen shut, thickness unknown.

Coal Blossom—No. 999 on Map II.

Jefferson District, in road along hillside north of Gauley River, 0.1 mile N. 22° W. of Vinton; **Douglas Coal**; elevation, 1420' B.
Coal blossom, thickness not determined.

Coal Blossom—No. 1000 on Map II.

Jefferson District, in road along hillside north of Gauley River, 0.3 mile N. 49° E. of Vinton; **Douglas Coal**; elevation, 1445' B.

	Ft.	In.
Coal blossom	0	6

Coal Blossom—No. 1001 on Map II.

Jefferson District, in road along hillside north of Gauley River, 0.7 mile N. 28° E. of Vinton; **Douglas Coal**; elevation, 1415' B.

	Ft.	In.
Coal blossom	1	0

Coal Blossom—No. 1002 on Map II.

Jefferson District, in road, along a short branch of Gauley River, 1.6 miles N. 42° E. of Vinton; **Douglas Coal**; elevation, 1575' B.

	Ft.	In.
Shale .....	..	..
Coal blossom, Douglas "A"	0	6
Fire clay shale.....	15	0
Coal, Douglas	0	8
Fire clay shale .....	..	..

Coal Blossom—No. 1003 on Map II.

Grant District, on hillside west of Peters Creek, 1.1 miles northeast of Drennen; **Douglas Coal**; elevation, 1160' B.

Coal blossom, thickness not determined.

Coal Exposure—No. 1004 on Map II.

Grant District, in road along a short branch of Peters Creek, 1.3 miles N. 10° E. of Poe; **Douglas Coal**; elevation, 1375' B.

	Ft.	In.
Sandstone, shaly, Dotson	10	0
Coal , slaty	1	0
Fire clay shale .....	..	..

Coal Exposure—No. 1005 on Map II.

Grant District, in road along a south branch of Whitewater Branch of Peters Creek, 1.7 miles north of Keslers Crosslanes; **Douglas Coal**; elevation, 1515' B.

	Ft.	In.
Shale, sandy	10	0
Coal	0	6
Shale and concealed to creek.....	3	0

Coal Exposure—No. 1006 on Map II.

Grant District, in road along hillside north of Peters Creek, 1.4 miles S. 40° W. of Gilboa; **Douglas Coal**; elevation, 1235' B.

	Ft.	In.
Sandstone, massive, Dotson	40	0
Slate, black	4	0
Coal	0	6
Shale and concealed to creek	7	0

Coal Blossom—No. 1007 on Map II.

Grant District, in road along hillside west of Peters Creek, 1.1 miles S. 26° W. of Gilboa; **Douglas Coal**; elevation, 1285' B.

Coal blossom, thickness not determined.

Coal Blossom—No. 1008 on Map II.

Grant District, in road, along hillside west of Peters Creek, 0.7 mile S. 26° W. of Gilboa; **Douglas Coal**; elevation, 1305' B.

Coal blossom, thickness not determined.

Coal Blossom—No. 1009 on Map II.

Grant District, in road along hillside west of Peters Creek, 0.2 mile S. 26° W. of Gilboa; **Douglas Coal**; elevation, 1300' B.

Coal blossom, thickness not determined.

Coal Blossom—No. 1010 on Map II.

Grant District, on a short branch of Peters Creek, 0.2 mile west of Gilboa; **Douglas Coal**; elevation, 1295' B.; for stratigraphic position see Gilboa Section, page 123.

Coal blossom, thickness not determined.

Coal Exposure—No. 1011 on Map II.

Grant District, in road at the head of Laurel Creek, 0.5 mile west of Keslers Crosslanes; **Douglas Coal**; elevation, 1615' B.

		Ft.	In.
Shale, sandy .....		..	..
Coal	1' 0"		
Fire clay	3 0		
Coal	1 6	5	6
Fire clay shale .....		..	..

Coal Blossom—No. 1012 on Map II.

Grant District, on Meadow Creek along road, 0.2 mile east of Keslers Crosslanes; **Douglas Coal**; elevation, 1575' B.

Black slate and coal, thickness not determined.

Coal Blossom—No. 1013 on Map II.

Grant District, in road along Meadow Creek, 0.2 mile N. 5° W. of Keslers Crosslanes; **Douglas Coal**; elevation, 1590' B.

		Ft.	In.
Shale, sandy .....		..	..
Coal, slaty	0' 6"		
Fire clay shale	6 0		
Coal	0 6	7	0
Fire clay shale with streaks of coal .....		..	..

Coal Blossom—No. 1014 on Map II.

Grant District, in road along a branch of Meadow Creek, 0.8 mile N. 29° E. of Keslers Crosslanes; **Douglas Coal**; elevation, 1585' B.

Coal blossom, thickness not determined.

Coal Blossom—No. 1015 on Map II.

Grant District, in road along a short branch of Meadow Creek, 1.0 mile N. 28° W. of Sparks; **Douglas Coal**; elevation, 1605' B.

Slate and coal blossom, thickness not determined.

Coal Exposure—No. 1016 on Map II.

Grant District, in road along a branch of Meadow Creek, 0.5 mile

west of Sparks; **Douglas Coal**; elevation, 1605' B.

	Ft.	In.
Shale, sandy .....	..	..
Coal	1' 0"	
Fire clay shale.....	8 0	
Coal	1 0	10 0
Fire clay shale .....		..

Coal Exposure—No. 1017 on Map II.

Grant District, on hillside west of Battle Run of Gauley River, 0.5 mile west of Sparks; **Douglas Coal**; elevation, 1625' B.

	Ft.	In.
Sandstone, massive, Dotson	15	0
Coal	0' 10"	
Fire clay shale	4 0	
Coal	0 6	5 4
Fire clay shale .....		..

Coal Exposure—No. 1018 on Map II.

Grant District, in road east of Battle Run of Gauley River, 0.2 mile west of Sparks; **Douglas Coal**; elevation, 1635' B.

	Ft.	In.
Coal	1	0

Coal Blossom—No. 1019 on Map II.

Grant District, in road east of Battle Run of Gauley River, 0.4 mile east of Sparks; **Douglas Coal**; elevation, 1665' B.

Coal blossom, thickness not determined.

Coal Blossom—No. 1020 on Map II.

Summersville District, on road west of McKee Creek, 0.2 mile S. 58° W. of Gad; **Douglas Coal**; elevation, 1735' B.

	Ft.	In.
Coal blossom	1	0

Coal Exposure—No. 1021 on Map II.

Summersville District, on road along hillside north of Salmon Run of Gauley River, 1.2 miles south of Summersville; **Douglas Coal**; elevation, 1790' B.

	Ft.	In.
Shale, sandy .....		..
Coal	0	6
Fire clay shale .....		..

Coal Blossom—No. 1022 on Map II.

Summersville District, on the south side of Peters Creek, 0.7 mile

N. 80° E. of Gilboa; **Douglas Coal**; elevation, 1360' B.

	Ft.	In.
Coal	0	6

Coal Blossom—No. 1023 on Map II.

Kentucky District, on road along ridge west of Taylor Run of Gauley River, 1.8 miles S. 84° W. of Holcomb; **Douglas Coal**; elevation, 2610' B.

Coal blossom, at spring, thickness not determined.

Walter Dorsey Coal Blossom—No. 1024 on Map II.

Kentucky District, in ridge road, 0.5 mile S. 30° E. of Nettie; **Douglas Coal**; elevation, 2670' B.

Coal blossom, at spring, thickness not determined.

Coal Blossom—No. 1025 on Map II.

Kentucky District, on hillside south of Jims Creek, 1.0 mile S. 48° E. of Deepwell; **Douglas Coal**; elevation, 2390' B.

Coal blossom, thickness not determined.

Coal Blossom—No. 1026 on Map II.

Wilderness District, on hillside south of Hominy Creek, on road, 1.4 miles east of Oak Hill School, and 3.3 miles N. 21° W. of Bruce; **Douglas Coal**; elevation, 2105' B.

Coal blossom, thickness not determined.

Coal Blossom—No. 1027 on Map II.

Wilderness District, in ridge road, 0.5 mile S. 71° E. of Spruce Grove School and 1.0 mile S. 23° E. of Bruce; **Douglas Coal**; elevation, 2695' B.

Coal blossom, thickness not determined.

Coal Blossom—No. 1028 on Map II.

Wilderness District, in ridge road, 0.3 mile east of Buckhorn School and 0.3 mile southwest of Snow Hill; **Douglas Coal**; elevation, 2870' B.

Coal streak at spring, (reported).

Coal Blossom—No. 1029 on Map II.

Wilderness District, in ridge road, 0.8 mile N. 8° E. of Mt. Nebo; **Douglas Coal**; elevation, 1975' B.

Coal streak, thickness not determined.

Coal Blossom—No. 1030 on Map II.

Wilderness District, in ridge road, 0.2 mile northwest of Fowler

Knob and 0.3 mile S. 47° E. of Mt. Nebo; **Douglas Coal**; elevation, 2120' B.

	Ft.	In.
Coal blossom, slaty	1	0

Coal Blossom—No. 1031 on Map II.

Wilderness District, in ridge road, 0.7 mile S. 51° E. of Mt. Nebo; **Douglas Coal**; elevation, 2130' B.

Coal blossom, thickness not determined.

Coal Blossom—No. 1032 on Map II.

Wilderness District, in ridge road, 0.9 mile S. 32° E. of Mt. Nebo; **Douglas Coal**; elevation, 2140' B.

Coal blossom, thickness not determined.

Coal Blossom—No. 1033 on Map II.

Wilderness District, in ridge road, 1.0 mile S. 36° E. of Mt. Nebo; **Douglas Coal**; elevation, 2150' B.

Coal blossom, thickness not determined.

Coal Blossom—No. 1034 on Map II.

Wilderness District, in ridge road, 0.25 mile N. 55° W. of McMillon School and 2.3 miles N. 23° E. of Runa; **Douglas Coal**; elevation, 2315' B.

Coal blossom, thickness not determined.

Coal Blossom—No. 1035 on Map II.

Wilderness District, in ridge road, 0.2 mile north of McMillon School and 2.4 miles N. 33° E. of Runa; **Douglas Coal**; elevation, 2335' B.

Coal blossom, thickness not determined.

Coal Blossom—No. 1036 on Map II.

Wilderness District, in ridge road, 0.1 mile south of McMillon School and 2.3 miles N. 41° E. of Runa; **Douglas Coal**; elevation, 2360' B.

Coal blossom, thickness not determined.

Coal Blossom—No. 1037 on Map II.

Wilderness District, in ridge road, 0.8 mile S. 28° W. of McMillon School and 1.6 miles N. 48° E. of Runa; **Douglas Coal**; elevation, 2385' B.

Coal blossom, thickness not determined.

LOWER DOTSON SANDSTONE.

The **Lower Dotson Sandstone** of Hennen¹⁰³, named from its relationship to the Dotson Sandstone of Mingo County, and coming a few feet below the Douglas Coal, appears generally throughout southwestern Nicholas. As a rule it is gray or light-brown, massive, frequently pebbly, and often forming cliffs, its thickness ranging from 20 to 50 feet. In Chapter IV it is noted in the sections for Chapman School, Cranberry (West), Cranberry (Southeast), and Gilboa. So far as known it has not been quarried in the county but its massive and durable character would make it suitable for structures where blocks of massive masonry are desired. The numerous exposures of the Douglas Coal, described on preceding pages, furnish a sufficient guide to its position at most points where it is best developed.

DOUGLAS SHALE.

The **Douglas Shale** of Hennen¹⁰⁴, named from its occurrence near the town of Douglas, McDowell County, where it comes just below the Lower Dotson Sandstone (erroneously termed Lower Nuttall in the Report cited), and occasionally bearing marine or brackish-water fossils, was identified at several points in central and southern Nicholas. As a rule it is dark, sandy, laminated, 5 to 15 feet in thickness, and contains brackish-water fossils at a few localities. In Chapter IV it is recorded in the sections for Camden-on-Gauley, Hookersville, Muddlety Creek, Persinger Ford (North), Persinger Ford (South), Summersville and Tipton.

Fossils were observed in the shale along the Summersville and Slaven Cabin Road, at an elevation of 1940' B., one-fourth mile northeast of Persinger Ford, *Naiadites elongata* being in evidence. Elsewhere it was not searched extensively for them but may prove to hold them at various of the localities mentioned above.

¹⁰³Ray V. Hennen, Fayette Report, W. Va. Geol. Survey, pp. 274-275; 1919.

¹⁰⁴Ray V. Hennen, Wyoming and McDowell Report, W. Va. Geol. Survey, pp. 183-184; 1915.

LOWER DOUGLAS COAL.

The **Lower Douglas Coal** of Hennen¹⁰⁵, named from its occurrence at the town of Douglas, McDowell County, where it comes just above the Panther Sandstone, which now proves to be the same as the Upper Nuttall, was noted at numerous points in southern Nicholas. As a rule it is soft and columnar, multiple-bedded, and varying in thickness from 1 to 2 feet, but frequently is split into two distinct benches by a shale parting varying from 1 to 4 feet, being very similar to the Douglas Coal in this respect. The coal is often slaty and on this account as well as because of its large parting is nearly always lacking in the necessary qualifications to classify it as a minable seam, but will furnish a limited amount of local domestic fuel in localities where better seams do not outcrop. Its position in the stratigraphic column is almost immediately above the great Upper Nuttall Sandstone, and from 300 to 400 feet below the Eagle Coal and 125 to 150 feet below the Gilbert. The following prospects and exposures were noted:

Coal Exposure—No. 1038 on Map II.

Jefferson District, on south side of Peters Creek, 0.1 mile southwest of Drennen; **Lower Douglas Coal**; elevation, 1180' B.

	Ft.	In.
Sandstone, massive, Lower Dotson .....	..	..
Shale, Douglas	5	0
Coal , visible	1	0
Fire clay shale		

Coal Blossom—No. 1039 on Map II.

Jefferson District, in road along hillside north of Laurel Creek, 0.1 mile west of Tipton; **Lower Douglas Coal**; elevation, 1265' B.

Coal blossom, thickness not determined.

Coal Blossom—No. 1040 on Map II.

Grant District, in road along hillside west of Keenan Branch of Peters Creek, 0.8 mile S. 58° W. of Zela; **Lower Douglas Coal**; elevation, 1255' B.

Coal blossom, thickness not determined.

¹⁰⁵Ibid., pp. 184-185.

J. P. Carden Coal Exposure—No. 1041 on Map II.

Grant District, in railroad cut along hillside south of Peters Creek, 1.0 mile S. 17° W. of Gilboa; **Lower Douglas Coal**; elevation, 1265' B.; fallen shut, reported as follows:

		Ft.	In.
Coal, soft	2' 0"		
Rock	2 0		
Coal, soft	2 0	6	0

Coal Exposure—No. 1042 on Map II.

Summersville District, in road along hillside west of Salmon Run of Gauley River, 1.5 miles S. 10° W. of Summersville; **Lower Douglas Coal**; elevation, 1730' B.

		Ft.	In.
Sandstone, shaly, Lower Dotson .....		..	..
Coal	0' 3"		
Slate, black	1 6		
Coal	0 8	2	5
Fire clay shale		15	0

Coal Exposure—No. 1043 on Map II.

Summersville District, in ravine west of Muddlety Creek, 1.6 miles N. 48° E. of Summersville; **Lower Douglas Coal**; elevation, 1805' B.; for stratigraphic position see Muddlety Creek Section, page 128.

		Ft.	In.
Shale, ferruginous, Douglas		1	0
Coal		0	4
Shale and concealed to Upper Nuttall Sandstone		3	0

Coal Blossom—No. 1044 on Map II.

Beaver District, on hillside south of Cranberry River, 0.9 mile S. 50° E. of Cranberry; **Lower Douglas Coal**; elevation, 2560' B.; for stratigraphic position see Cranberry (Southeast) Section, page 158.

Coal blossom, thickness not determined.

W. A. Music Prospect—No. 1045 on Map II.

Beaver Creek, on hillside south of Cranberry River, 2.7 miles S. 64° E. of Cranberry; **Lower Douglas Coal**; elevation, 2850' B. Prospect closed, not much found.

Coal Blossom—No. 1046 on Map II.

Richwood District, on hillside west of North Fork of Cherry River, 1.8 miles N. 15° E. of Richwood; **Lower Douglas Coal**; elevation, 2980' B.

Coal blossom, thickness not determined.



PLATE XIII.—Falls of Rockcamp Run over Lower Gilbert Sandstone 0.8 mile west of Allingdale.
Photo by E. E. Harris.

Simeon Spencer Coal Prospect—No. 1048 on Map II.

Kentucky District, on hillside east of source of Adkins Lick Run of Panther Creek, 1.9 miles S. 82° W. of Holcomb; **Lower Douglas Coal**; elevation, 2565' B.; fallen shut.

	Ft.	In.
Coal, reported	0	6

Coal Blossom—No. 1049 on Map II.

Kentucky District, in ridge road east of Panther Creek, 0.3 mile N. 28° E. of Thorny Knob School and 1.8 miles N. 73° E. of Lowland; **Douglas Coal**; elevation, 2690' B.

Coal blossom, thickness not determined.

Coal Exposure—No. 1050 on Map II.

Kentucky District, in ridge road east of Panther Creek and near Thorny Knob, 1.1 miles S. 66° E. of Lowland; **Lower Douglas Coal**; elevation, 2730' B.

	Ft.	In.
Shale, sandy, Douglas		
Coal, slaty, about	1'	6"
Fire clay shale	2	0
Coal, slaty, about	1	0
	4	6
Fire clay shale.....		

Coal Blossom—No. 1051 on Map II.

Kentucky District, in road along hillside west of Little Laurel Creek, 3.3 miles S. 60° W. of Curtin; **Lower Douglas Coal**; elevation, 2350' B.; for stratigraphic position see Chapman School Section, page 163.

Coal streak, thickness not reported.

Coal Blossom—No. 1052 on Map II.

Kentucky District, in road west of Fury Knob, 1.2 miles S. 30° E. of Deepwell; **Lower Douglas Coal**; elevation, 2275' B.; for stratigraphic position see Fury Knob Section, page 170.

Coal blossom, thickness not determined.

Coal Exposure—No. 1053 on Map II.

Kentucky District on hillside west of Odell Spring Branch of Jims Creek, 1.8 miles S. 26° E. of Deepwell; **Lower Douglas Coal**; elevation, 2390' B.

	Ft.	In.
Coal, bony, reported	1	0

A. J. Groves Prospect—No. 1054 on Map II.

Kentucky District, east of road, on hillside, 0.2 mile S. 37° E. of Ophelia; **Lower Douglas Coal**; elevation, 2565' B.; fallen shut.

	Ft.	In.
Coal, reported, with slate roof and rock bottom....	1	8

Coal Blossom—No. 1055 on Map II.

Kentucky District, in road along hillside east of Gauley River, 2.4 miles S. 65° E. of Summersville; **Lower Douglas Coal**; elevation, 1850' B.

Coal blossom, at base of sandstone, thickness not determined.

Coal Blossom—No. 1056 on Map II.

Wilderness District, in road along hillside south of Gauley River, 0.5 mile S. 64° E. of Hughes Ferry Bridge; **Lower Douglas Coal**; elevation, 1775' B.

Coal blossom, thickness not determined.

Coal Blossom—No. 1057 on Map II.

Wilderness District, in road along hillside south of Gauley River, 1.5 miles N. 62° W. of Mt. Nebo; **Lower Douglas Coal**; elevation, 1810' B.; for stratigraphic position see Rucker Bend Section, page 174.

	Ft.	In.
Coal streak, reported	0	10

Coal Blossom—No. 1058 on Map II.

Wilderness District, in ridge road at head of a branch of Collison Creek, 0.9 mile S. 50° E. of Mt. Nebo; **Lower Douglas Coal**; elevation, 2110' B.

Coal blossom, thickness not determined.

Coal Blossom—No. 1059 on Map II.

Wilderness District, in ridge road north of Anglins Creek, 0.8 mile S. 28° W. of McMillon School and 1.6 miles N. 48° E. of Runa; **Lower Douglas Coal**; elevation, 2375' B.

Coal blossom, thickness not determined.

Coal Exposure—No. 1060 on Map II.

Wilderness District, in ridge road north of Anglins Creek, 0.9

mile S. 28° W. of McMillon School and 1.5 miles N. 49° E. of Runa;
Lower Douglas Coal; elevation, 2365' B.

	Ft.	In.
Sandstone, Lower Dotson.....	10	0
Coal	1	0
Shale, sandy, Douglas	10	0
Coal	0'	8"
Shale, gray	2	0
Coal	0	6
Shale, sandy		

Silver Jones Prospect—No. 1061 on Map II.

Wilderness District, on hillside north of ridge road, 0.4 mile S. 80° E. of Spruce Grove School and 1.2 miles N. 13° W. of Snow Hill;
Lower Douglas Coal; elevation, 2625' B.

Prospect fallen shut, thickness unknown.

Lawrence Nutter Prospect—No. 1062 on Map II.

Wilderness District, on south side of Elevenmile Fork of Anglins Creek, 0.6 mile northeast of Snow Hill; Lower Douglas Coal; elevation, 2690' B.

Coal prospect, abandoned, thickness unknown.

Lawrence Nutter Prospect—No. 1063 on Map II.

Wilderness District, on south side of Elevenmile Fork of Anglins Creek, 0.6 mile northeast of Snow Hill; Lower Douglas Coal; elevation, 2685' B.

	Ft.	In.
Coal, clean, reported	2	0

Coal Blossom—No. 1064 on Map II.

Wilderness District, in ridge road north of Anglins Creek, 0.3 mile southwest of Snow Hill; Lower Douglas Coal; elevation, 2880' B.

Coal blossom, thickness not determined.

J. A. Alderson Coal Prospect—No. 1065 on Map II.

Wilderness District, in road, between Anglins and Hominy Creeks, 0.5 mile N. 85° W. of Snow Hill School and 2.3 miles N. 74° W. of Bamboo; Lower Douglas Coal; elevation, 2925' B.; fallen shut.

	Ft.	In.
Coal, reported, 1' 10" to	2	0

Thomas McClung Prospect—No. 1066 on Map II.

Wilderness District, near ridge road east of Meadow River, 0.9 mile N. 65° W. of Mt. Lookout; Lower Douglas Coal; elevation,

1935' B.

	Ft.	In.
Shale, dark, sandy, Douglas	3	0
Coal, concealed by water, reported	1	8

Coal Blossom—No. 1067 on Map II.

Wilderness District, in ridge road east of Meadow River, 0.6 mile N. 51° W. of Mt. Lookout; **Lower Douglas Coal**; elevation, 1940' B.
Coal blossom, thickness not determined.

Coal Blossom—No. 1068 on Map II.

Wilderness District, along ridge road, 0.5 mile N. 77° E. of Bell Schoolhouse and 1.6 miles S. 76° E. of Mt. Lookout; **Lower Douglas Coal**; elevation, 2135' B.
Slate and coal streak, thickness not determined.

CHAPTER VII.

STRATIGRAPHY -- NEW RIVER AND POCAHONTAS GROUPS OF THE POTTSVILLE SERIES.

GENERAL DESCRIPTION, NEW RIVER GROUP.

The **New River Group** of Fontaine¹, or **Middle Pottsville** of White², named from its magnificent development along New River in Fayette and Raleigh Counties, West Virginia, and first studied by Prof. Wm. M. Fontaine in 1874, and later described in detail by Dr. I. C. White, composes roughly the lower two-fifths of the Pottsville sediments in Nicholas County, there being only a few remnants of the Pocahontas Group lying between it and the red Mauch Chunk Shales. As it occurs therein it may be defined as starting with the top of the Upper Nuttall Sandstone and extending downward to the base of the Pineville Sandstone, which lies just over the Mauch Chunk reds, except at occasional points where fragments of the Pocahontas intervene. The New River Group is known to be present in the measures over the entire county, except in a few square miles on the two forks of Cherry River near Richwood at the extreme southeastern corner, where the drainage has cut entirely through it, exposing the red beds, but leaving the New River exposed in full along the mountain-

¹Prof. Wm. M. Fontaine, *The Great Conglomerate on New River, West Virginia*; Amer. Jour. Science, third series, Vol. VII, 1874, pp. 459-573. *The Conglomerate Series of West Virginia*; Amer. Jour. Science, third series, Vol. IX, 1876, pp. 276-374.

²I. C. White, Vol. II(A), W. Va. Geol. Survey, p. 13; 1908.

sides. North of the Gauley River, where it lies principally under drainage, its thickness and character are known only through scanty bore hole records, in some of which there is a complete absence of commercial New River coal, making the identification of these strata somewhat uncertain. Along both sides of the Gauley, however, the group is exposed at most points down to the Sewell Coal, and in the region lying south of that river composing all of Richwood, Kentucky, and Wilderness Districts, and a considerable portion of Beaver, the New River Group is the main body of outcropping sediments. In this region some of its coals have developed into commercial beds of good thickness and great intrinsic value. In this region its maximum thickness is approximately 800 feet, being about four-fifths of the maximum for the State as exposed in southern McDowell County where it approaches 1050 feet.

In Nicholas the New River Group is composed of massive, gray sandstones, very hard and sometimes pebbly, alternating with layers of dark or sandy shales, some of which contain fossils of brackish-water origin, and beds of soft, columnar coal, there being no limestones of any kind except occasional small, ferruginous concretions in some of the shales. Lithologically the group contains approximately 73.75 per cent. of sandstone, 22.5 per cent. of shale, and 3.75 per cent. of coal.

The thickness, stratigraphic position, and general character of the various members of the New River Group are presented in Chapter VI, pages 209 to 211, in the General Section of the Pottsville Series. In Chapter IV are published many measured sections at different points of the county, showing detailed stratigraphic studies.

DESCRIPTION OF MEMBERS, NEW RIVER GROUP.

UPPER NUTTALL SANDSTONE.

The Nuttall Sandstone of Campbell and White³, later

³M. R. Campbell, Raleigh Folio No. 77, U. S. Geol. Survey, 1901. I. C. White, Bull. 65, U. S. Geol. Survey, p. 200; 1891; Vol. II, W. Va. Geol. Survey, pp. 616 and 655; 1903; and Vol. II(A), W. Va. Geol. Survey, pp. 253-254; 1908.

termed the **Upper Nuttall Sandstone** by Hennen⁴, for the sake of convenience to distinguish it from the Lower Nuttall which is a distinct stratum, and named from its occurrence along New River, Fayette County, between Nuttallburg and Gauley Bridge, where it is a prominent ledge coming a few feet above the Lower Nuttall, and being the topmost member of the New River Group, is a prominent stratum throughout southern Nicholas. As a rule it is gray, massive, sometimes slightly pebbly, 50 to 90 feet thick, and often forming cliffs, its top coming 350 to 500 feet above the Sewell Coal. In Chapter IV it is noted in the sections for Anglins Creek, Burl, Camden-on-Gauley, Carnifex Ferry, Chapman School, Coggins Knob, Cranberry (West), Cranberry (Southeast), Dade, Deepwell (Northwest), Deepwell (Southeast), Fenwick, Gilboa, Hominy Falls, Hominy Ford, Hookersville, Long Point of Gauley, Lowland, Mt. Lookout, Orndorff Bridge, Panther Mountain, Persinger Ford (North), Persinger Ford (South), Richwood, Rucker Bend, Summersville, and Tipton, the same demonstrating its wide-spread occurrence in the county.

Along Gauley River the Upper Nuttall rises above drainage just above the mouth of Laurel Creek, and slightly more than one mile southeast of Swiss, and so remains to within about one mile of the Webster County Line where it dips under the river. For a large portion of the distance between these two points it forms a prominent cliff or bluff at the summit of the plateau level on either side of the river. North of Gauley its outcrop extends up Peters Creek a short distance above the mouth of Stillhouse Branch, up Muddlety Creek to a point one-fourth mile or more above the Summersville and Slaven Cabin Road, up Persinger Creek to a point about the same distance above the same highway, and up Beaver Creek a short distance above the mouth of Granny Run. South of Gauley it is much higher, generally forming the rim of the plateau through which the major drainage basins have cut their channels, and making a topographic feature that stands out in bold relief as compared to the soft shales of the Douglas stage just above it.

⁴Ray V. Hennen, Fayette Report, W. Va. Geol. Survey, p. 295; 1919.

So far as known the Upper Nuttall has not been quarried in the county and as a general rule it is doubtful whether it would prove satisfactory for general building purposes as it is often much cross-bedded, with frequent pockets of shale or shaly sandstone, the more resistant portions of the ledge, in contrast, being frequently so hard that quarrying would be difficult and expensive.

IAEGER "B" COAL.

The **Iaeger "B" Coal** of Hennen⁵, named from its occurrence in McDowell County, and belonging in the interval between the Upper and Lower Nuttall Sandstones, was observed at various points in southern Nicholas but at all exposures appears to be too thin and slaty to be of economic value. Several attempts have been made to mine it for local domestic use, most of which have been failures. As a rule it is multiple-bedded, soft and columnar and frequently slaty, its thickness usually being one foot or less but sometimes approaching two feet, while at many points it appears to be entirely absent. The following exposures were noted:

Coal Exposure—No. 1069 on Map II.

Jefferson District, on north bank of Gauley River, 1.4 miles S. 40° E. of Swiss; **laeger "B" Coal**; elevation, 735' B.

	Ft.	In.
Sandstone, massive, pebbly at base, current-bedded,		
Upper Nuttall	25	0
Coal , soft	1' 1"	
Shale , gray	1	8
Coal	0	1
.....	2	10
.....	1	0
Fire clay shale to grade	1	0

Coal Blossom—No. 1070 on Map II.

Summersville District, on a south branch of Whitewater Branch of Peters Creek, 0.5 mile S. 82° W. of Burl; **laeger "B" Coal**; elevation, 1380' B.; for stratigraphic position see Burl Section, page 124.

Coal streak, reported in creek, thickness unknown.

⁵Ray V. Hennen, Wyoming and McDowell Report, W. Va. Geol. Survey, pp. 186-187; 1915.

Coal Exposure—No. 1071 on Map II.

Beaver District, on road along hillside south of Cranberry River, 0.8 mile S. 55° E. of Cranberry; *laeger* "B" Coal; elevation, 2385' B.; for details see Cranberry (Southeast) Section, page 169.

John Spencer Prospect—No. 1072 on Map II.

Kentucky District, on hillside east of Riley Branch of Jims Creek, 0.2 mile N. 69° W. of Ophelia; *laeger* "B" Coal; elevation, 2410' B.

	Ft.	In.
1. Sandstone, massive.....	6	0
2. Slate, dark, 0' 0" to	0	6
3. Coal, soft	1	5
4. Slate, pavement, sandy shale, and concealed to Riley Branch		

A sample (No. 358R) was collected from No. 3 of section, the composition of which is published under Mine No. 1072 in the Survey Table of Coal Analyses at the end of Chapter X.

Coal Blossom—No. 1073 on Map II.

Kentucky District, in road north of Hominy Creek, 2.3 miles N. 78° W. of Hominy Mill; *laeger* "B" Coal; elevation, 2515' B.; for stratigraphic position see Orndorff Bridge Section, page 172.

Coal blossom, thickness not determined.

Coal Blossom—No. 1074 on Map II.

Kentucky District, on road north of Grassy Creek, 0.6 mile N. 19° E. of Grassy Falls; *laeger* "B" Coal; elevation, 2640' B.

Coal blossom, bedded in shale.

Coal Blossom—No. 1075 on Map II.

Wilderness District, on Mouse Fork of Hominy Creek, 1.8 miles northwest of Bruce; *laeger* "B" Coal, elevation, 2195' B.

Coal blossom, thickness not determined.

Coal Prospect—No. 1076 on Map II.

Wilderness District, on Mouse Fork of Hominy Creek, 0.9 mile N. 37° W. of Bruce; *laeger* "B" Coal; elevation, 2335' B.

Fallen shut, little slate and coal on dump.

A. O. O'Dell Prospect—No. 1077 on Map II.

Wilderness District, at the head of a branch of Hominy Creek, 0.4

mile northeast of Bruce; laeger "B" Coal; elevation, 2370' B.; fallen shut.

	Ft.	In.
Coal, with mud seams, reported 2' 2" to.....	2	3

Coal Exposure—No. 1078 on Map II.

Wilderness District, in ridge road west of Mouse Fork of Hominy Creek, 1.3 miles S. 80° W. of Bruce; laeger "B" Coal; elevation, 2455' B.

	Ft.	In.
Sandstone, Upper Nuttall	15	0
Shale, sandy	5	0
Coal	0	4"
Shale, gray	0	9
Coal	0	8
Fire clay shale		

Coal Blossom—No. 1079 on Map II.

Wilderness District, in ridge road north of Elevenmile Fork of Anglins Creek, 1.2 miles S. 28° W. of Bruce; laeger "B" Coal; elevation, 2530' B.

Coal blossom, thickness not determined.

Coal Exposure—No. 1080 on Map II.

Wilderness District, in road south of Elevenmile Fork of Anglins Creek, 0.8 mile northwest of Snow Hill; laeger "B" Coal; elevation, 2615' B.

	Ft.	In.
Shale, sandy.....	..	..
Coal and slate	1	0
Fire clay shale		

Coal Blossom—No. 1081 on Map II.

Wilderness District, in ridge road, at Buckhorn School, 3.1 miles S. 79° W. of Hominy Falls; laeger "B" Coal; elevation, 2700' B.

Black slate and coal blossom, bedded in shale, thickness not determined.

Coal Exposure—No. 1082 on Map II.

Wilderness District, on a branch of Anglins Creek, 2.2 miles N. 86° W. of Bamboo; laeger "B" Coal; elevation, 2840' B.

	Ft.	In.
Shale, sandy .....	..	..
Coal	1	2
Slate, pavement		

James N. Pitsenberger Prospect—No. 1083 on Map II.

Wilderness District, at the head of a branch of Meadow River, 1.7 miles N. 63° W. of Runa; **laeger "B" Coal**; elevation, 2065' B.

Fallen shut, reported as follows by G. L. Pitsenberger:

	Ft.	In.
Sandstone, Upper Nuttall .....		..
Coal , good	0'	10"
Slate	0	8
Coal , good.....	1	0
	2	6

LOWER NUTTALL SANDSTONE.

The **Lower Nuttall Sandstone** of Hennen⁶, named from its close relationship to the Upper Nuttall Sandstone in the New River gorge of Fayette County, and being separated from the latter by an interval of only a few feet, is found generally in southern Nicholas where its horizon outcrops. As a rule it is massive, light-brown or gray, usually carrying an abundance of large rounded quartz pebbles, one inch or less in diameter, being 75 to 110 feet in thickness and frequently forming great cliffs that extend for miles with scarcely a break and making it rank as the most conspicuous single sandstone ledge of the county. As compared to the Upper Nuttall it is much more pebbly, more massive and less current-bedded, with fewer shaly streaks, and its color is much darker. In Chapter IV it is recorded in the sections for Bamboo, Camden-on-Gauley, Carnifex Ferry, Coggins Knob, Cranberry (West), Cranberry (Southeast), Deepwell (Northwest), Deepwell (Southeast), Dogway, Fenwick, Gilboa, Hominy Falls, Hominy Ford, Hookersville, Long Point of Gauley, Lowland, Mt. Lookout, Nallen, Orndorff Bridge, Panther Mountain, Persinger Ford (North), Persinger Ford (South), Rich Fork of Anthony Creek, Richwood, and Rucker Bend of Gauley.

On the Gauley River the Lower Nuttall rises above drainage $2\frac{1}{2}$ miles southeast of Swiss and remains above water-level almost entirely across the county to the mouth of Enoch Branch, one mile, air-line measure, from the Nicholas-Webster Line. East and west of these two points it is below

⁶Ray V. Hennen, Fayette Report, W. Va. Geol. Survey, p. 297; 1919.

drainage, owing to the northward dip of the measures. Throughout almost the entire distance of this long outcrop it makes an immense vertical cliff on either side of the river, so steep and high that it can be scaled only at infrequent intervals. A conspicuous outcrop is at the Long Point, 5 miles southwestward from Summersville, where it makes a huge promontory, standing almost perpendicularly above the river. North of the Gauley its outcrop extends up Peters Creek for about one mile, up Muddlety Creek nearly to the Summersville and Slaven Cabin Road, up Persinger Creek to the same highway where it goes under drainage, and up Beaver Creek for about $1\frac{1}{2}$ miles. South of Gauley it usually forms the second cliff below the rim of the plateau, being exposed along the major drainage channels, and gradually rising southeastward until it is several hundred feet above drainage along the Greenbrier and Pocahontas County Lines. In this southern region it does not preserve the same cliff-forming character as along Gauley, being often represented on the surface by a steep bluff, partially covered by talus from the Upper Nuttall above it. So far as known no attempt to quarry it has been made in the county and owing to its tough character it would doubtless be hard to split, but if once quarried and put in place it would make practically indestructible masonry.

The **Iaeger "A" Coal** of Hennen⁷, named from its occurrence in McDowell County, where it comes only a few feet under what now appears to be the true Lower Nuttall Sandstone (the same having been erroneously correlated as "Upper Iaeger" in that volume), was not noted in Nicholas, having evidently disappeared in the northeastward thinning of the measures.

UPPER IAEGER SHALE.

The **Upper Iaeger Shale**, of Hennen⁸, named from its occurrence in McDowell County, where it comes between the "Upper Iaeger" (Lower Nuttall) Sandstone and the "Iaeger"

⁷Ray V. Hennen, Wyoming and McDowell Report, W. Va. Geol. Survey, p. 188; 1915.

⁸Ibid., pp. 188-189.

(Hughes Ferry) Coal, is present in Nicholas, its position being between the Lower Nuttall Sandstone and Hughes Ferry Coal. It varies in thickness from 0 to 15 feet, being occasionally absent and allowing the sandstone to rest directly on the coal, its character being that of a dark, argillaceous shale, frequently carrying plant fossils. Numerous detailed occurrences will be noted in connection with the description of the Hughes Ferry Coal on subsequent pages.

HUGHES FERRY (IAEGER) COAL.

The **Hughes Ferry Coal** of White⁹, named from its occurrence on the north side of Gauley River, just above the Hughes Ferry Bridge, 2.8 miles south of Summersville, Nicholas County, where it comes a few feet below the great Lower Nuttall cliff, and believed by Hennen¹⁰ to represent the *Iaeger* Coal of White¹¹, was observed at numerous points in southern Nicholas. As a rule it is a single-, but infrequently double-bedded, coal, soft and columnar, of typical New River quality and appearance, varying from 1 to 2 feet in thickness, being usually nearer the former figure. Its uniformly good quality may encourage its use to a limited extent for local domestic fuel in localities where thicker seams do not outcrop but it is too thin to have any present commercial value. Its interval above the Sewell Coal in those regions where it is above drainage varies from 150 to 275 feet, but going northward from Gauley where it is principally under drainage its interval decreases rapidly to 100 feet or less, as shown by such borings as record it. The following prospects and exposures were noted:

Coal Exposure—No. 1084 on Map II.

Jefferson District, on hillside north of Gauley River, 2.9 miles S. 44° E. of Swiss; **Hughes Ferry (Iaeger) Coal**; elevation, 755' B.

	Ft.	In.
Sandstone, massive, Lower Nuttall	60	0
Shale, dark, Upper Iaeger	2	0

⁹I. C. White, Vol. II(A), W. Va. Geol. Survey, pp. 252-253; 1908.

¹⁰Ray V. Hennen, Fayette Report, W. Va. Geol. Survey, pp. 299-303; 1919.

¹¹I. C. White, Vol. II(A), W. Va. Geol. Survey, pp. 251-252; 1908.

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	Ft.	In.
Coal	0	6
Slate, dark, and fire clay to grade	2	0

Coal Exposure—No. 1085 on Map II.

Jefferson District, along railroad, east side of Peters Creek, 1.9 miles south of Lockwood; **Hughes Ferry (laeger) Coal**; elevation, 980' B.

	Ft.	In.
Sandstone, great cliff, pebbly, Lower Nuttall	100	0
Coal	1	0
Sandstone, shaly	15	0

Coal Exposure—No. 1086 on Map II.

Summersville District, on hillside north of Gauley River at Long Point, 1.4 miles N. 49° W. of Mt. Nebo; **Hughes Ferry (laeger) Coal**; elevation, 1630' B.; for stratigraphic position see Long Point of Gauley Section, page 126.

	Ft.	In.
Sandstone, massive, pebbly, great cliff, Lower Nuttall	95	0
Coal	0	10
Shale, sandy		

Coal Prospect—No. 1087 on Map II.

Summersville District, on north bank of Gauley River, 0.1 mile east of Hughes Ferry Bridge; **Hughes Ferry (laeger) Coal**); elevation, 1850' B.

	Ft.	In.
Sandstone, massive, cliff rock, Lower Nuttall , 70' to 100'	100	0
Concealed	6	0
Shale, dark	2	0
Coal, soft	1	3
Slate, pavement		

The above is the type locality of the Hughes Ferry Coal.

Coal Blossom—No. 1088 on Map II.

Beaver District, in road along hillside south of Cranberry River. 0.6 mile S. 54° E. of Cranberry; **Hughes Ferry (laeger) Coal**; elevation, 2255' B.; for stratigraphic position see Cranberry (Southeast) Section, page 157.

Coal blossom, thickness not determined.

Weston Lumber Company Prospect—No. 1088A on Map II.

Beaver District, on east side of Gauley River, 2 miles northward from Cranberry Station; **Hughes Ferry (laeger) Coal**; elevation, 2050' B.

	Ft.	In.
Sandstone, massive, Lower Nuttall		

	Ft.	In.
Concealed	25	0
Shale, dark, Upper laeger	5	0
Coal, soft	1	6
Slate, pavement		

Coal Blossom—No. 1088B on Map II.

Richwood District, on hillside east of South Fork of Cherry River, 1.0 mile east of Richwood; **Hughes Ferry (laeger) Coal**; elevation, 3210' B.

Black slate and **coal blossom**, at spring, thickness not determined.

Coal Blossom—No. 1089 on Map II.

Kentucky District, in road west of Laurel Creek, 1.0 mile S. 62° W. of Fenwick; **Hughes Ferry (laeger) Coal**; elevation, 2680' B.; for stratigraphic position see Fenwick Section, page 162.

Coal blossom, thickness not determined.

Coal Blossom—No. 1090 on Map II.

Kentucky District, on hillside east of Panther Creek, 0.3 mile S. 70° E. of Lowland; **Hughes Ferry (laeger) Coal**; elevation, 2490' B.

Coal blossom, thickness not determined.

Coal Blossom—No. 1091 on Map II.

Kentucky District, in road west of Jims Creek, 0.5 mile S. 29° E. of Deepwell; **Hughes Ferry (laeger) Coal**; elevation, 1970' B.; for stratigraphic position see Fury Knob Section, page 170.

Coal blossom, thickness not determined.

Coal Blossom—No. 1092 on Map II.

Kentucky District, on hillside south of Jims Creek, 0.9 mile S. 40° E. of Deepwell; **Hughes Ferry (laeger) Coal**; elevation, 2015' B.

Coal blossom, thickness not determined.

M. R. Groves Farm Mine—No. 1093 on Map II.

Kentucky District, on hillside south of Jims Creek, 1.0 mile S. 46° E. of Deepwell; **Hughes Ferry (laeger) Coal**; elevation, 2025' B.

	Ft.	In.
1. Shale, dark, Upper laeger	3	0
2. Coal, soft	2	2
3. Slate, pavement		

A sample (No. 355R) was collected from No. 2 of section the composition of which is published under Mine No. 1093 in the Survey Table of Coal Analyses at the end of Chapter X.

Coal Blossom—No. 1094 on Map II.

Kentucky District, in road south of Deer Creek, 0.2 mile east of Deepwell; **Hughes Ferry (laeger) Coal**; elevation, 1910' B.; for stratigraphic position see Deepwell (Southeast) Section, page 169.

Coal blossom, thickness not determined.

Coal Prospect—No. 1095 on Map II.

Kentucky District, in road up hillside east of Hominy Creek, 0.9 mile N. 77° E. of Blacks Chapel School and 1.8 miles N. 35° E. of Mt. Nebo; **Hughes Ferry (laeger) Coal**; elevation, 1695' B.; fallen shut; for stratigraphic position see Hominy Ford Section, page 166.

Coal Blossom—No. 1096 on Map II.

Kentucky District, on the head of Roaring Creek, 2.1 miles S. 62° E. of Hominy Falls; **Hughes Ferry (laeger) Coal**; elevation, 2770' B.

Coal blossom, thickness not determined.

Coal Blossom—No. 1097 on Map II.

Kentucky District, in road south of Coggins Knob, 1.6 miles S. 25° E. of Hominy Falls; **Hughes Ferry (laeger) Coal**; elevation, 2735' B.; for stratigraphic position see Coggins Knob Section, page 173.

Coal blossom, thickness not determined.

Coal Blossom—No. 1098 on Map II.

Kentucky District, on the south side of a branch of Hominy Creek, 0.5 mile S. 70° E. of McClung School and 2.2 miles N. 82° E. of Bamboo; **Hughes Ferry (laeger) Coal**; elevation, 2990' B.

Coal blossom, at spring, thickness not determined.

Mountain City Lumber Co. Prospect—No. 1099 on Map II.

Wilderness District, on a branch of Mouse Fork of Hominy Creek, 1.8 miles N. 22° W. of Bruce; **Hughes Ferry (laeger) Coal**; elevation, 2050' B.

	Ft.	In.
1. Shale, black, Upper laeger	3	0
2. Coal, soft	1	5
3. Slate, pavement		

A sample (No. 347R) was collected from No. 2 of section, the composition of which is published under **Mine No. 1099** in the Survey Table of Coal Analyses at the end of Chapter X.

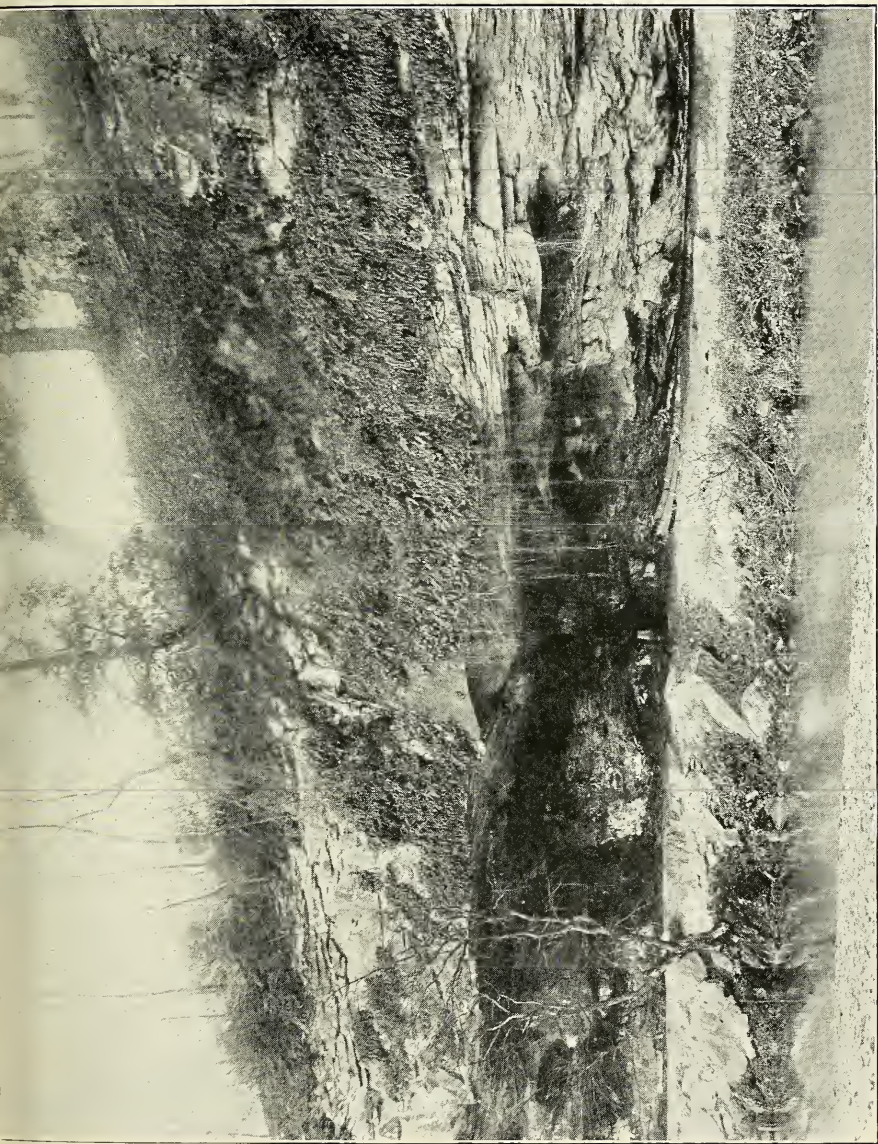


PLATE XIV.—Lower Gilbert Sandstone at mouth of Bells Creek, one-half mile northeast of Belva.
Photo by E. E. Harris.

Wm. Smith Prospect—No. 1100 on Map II.

Wilderness District, on the east side of Mouse Fork of Hominy Creek, 1.1 miles N. 52° W. of Bruce; Hughes Ferry (laeger) Coal; elevation, 2160' B.

Fallen shut, apparently 1' 0" to 2' 0" of coal.

Gauley Coal Land Company Prospect (Donald Thomas Opening)—No. 1101 on Map II.

Wilderness District, on the head of Mouse Fork of Hominy Creek, 0.8 mile S. 43° W. of Bruce; Hughes Ferry (laeger) Coal; elevation, 2340' B.

	Ft.	In.
1. Shale, dark	2	0
2. Coal, soft	1	8
3. Slate, pavement		

A sample (No. 345R) was collected from No. 2 of section, the composition of which is published under Mine No. 1101 in the Survey Table of Coal Analyses at the end of Chapter X.

Gauley Coal Land Company Prospect—No. 1102 on Map II.

Wilderness District, on south side of Gauley River, 1.5 miles northwest of Mt. Nebo; Hughes Ferry (laeger) Coal; elevation, 1570' B.; for details see Rucker Bend Section, page 174.

Coal from the above prospect was once used for black-smithing by John Tygart, the prospect having fallen shut previous to the writer's visit.

Coal Prospect—No. 1103 on Map II.

Wilderness District, on hillside east of Meadow River, 0.7 mile S. 24° E. of Carnifex Ferry; Hughes Ferry (laeger) Coal; elevation, 1555' B.

Fallen shut, not much found?

Coal Prospect—No. 1104 on Map II.

Wilderness District, on hillside north of Meadow River, 1.5 miles S. 56° W. of Mt. Lookout; Hughes Ferry (laeger) Coal; elevation, 1705' B.; fallen shut; for stratigraphic position, see Mt. Lookout Section, page 178.

Coal Blossom—No. 1105 on Map II.

Wilderness District, along road on eastern hillside of Meadow River, 0.6 mile northeast of Nallen; **Hughes Ferry (laeger) Coal**; elevation, 2200' B.; for stratigraphic position see Nallen Section, page 179.

Coal Blossom—No. 1106 on Map II.

Wilderness District, in road north of Anglins Creek, 0.5 mile S. 49° W. of Runa; **Hughes Ferry (laeger) Coal**; elevation, 2060' B.

	Ft.	In.
Shale, sandy, Upper laeger .....	..	..
Coal blossom , thickness concealed .....	..	..
Fire clay and shale	5	0

Erskin Nutter Prospect—No. 1107 on Map II.

Wilderness District, at the head of Sugar Grove Creek, 0.3 mile S. 55° E. of Sugar Grove School and 2.8 miles S. 42° W. of Snow Hill; **Hughes Ferry (laeger) Coal**; elevation, 2860' B.

Fallen shut, thickness unknown.

Coal Blossom—No. 1108 on Map II.

Wilderness District, in road at head of Murphy Branch of Anglins Creek, 2.3 miles S. 65° W. of Snow Hill; **Hughes Ferry (laeger) Coal**; elevation, 2575' B.; for stratigraphic position see Anglins Creek Section, page 178.

Coal blossom, heavy, thickness not determined.

Coal Blossom—No. 1109 on Map II.

Wilderness District, on Elevenmile Fork of Anglins Creek, 1.0 mile west of Snow Hill; **Hughes Ferry (laeger) Coal**; elevation, 2440' B.

Coal blossom, thickness not determined.

MIDDLE IAEGER SANDSTONE.

The **Middle Iaeger Sandstone** of Hennen¹², named from its occurrence at Iaeger, McDowell County, where it comes between the **Hughes Ferry (Iaeger) Coal** and the **Lower Iaeger Coal**, was noted at a few points in southwestern Nicholas, but is not a conspicuous ledge. As a rule it is massive, grayish-

¹²Ray V. Hennen, Wyoming and McDowell Report, W. Va. Geol. Survey, p. 190; 1915.

white, medium-coarse, 10 to 40 feet in thickness, with a tendency toward being lenticular as it is apparently replaced by shale in certain localities. In Chapter IV it is recorded in the sections for Anglins Creek, Carnifex Ferry, Cranberry (Southeast), Long Point of Gauley, Mt. Lookout, Nallen, Orndorff Bridge, and Rucker Bend of Gauley. So far as known it has not been quarried in the county and owing to its lenticular and occasional shaly nature does not appear to be as good building stone as many other ledges of a more dependable character.

LOWER IAEGER COAL.

The **Lower Iaeger Coal** of Hennen¹³, named from its occurrence at Iaeger, McDowell County, where it comes just below the Middle Iaeger Sandstone, was observed at a few localities in Nicholas but is entirely too thin and lenticular for commercial mining. It may possibly furnish a limited amount of local domestic fuel in certain regions where other seams of more dependable character do not outcrop. As a rule it is one foot or less in thickness, but in a few instances approaches 2 feet, being soft, columnar and occasionally double-bedded, its interval above the Sewell in the region south of Gauley where it principally outcrops varying from 125 to 250 feet. The following exposures and prospects were noted:

Coal Prospect—No. 1110 on Map II.

Beaver District, in road south of Cranberry River, 0.5 mile southeast of Cranberry Station; **Lower Iaeger Coal**; elevation, 2170' B.; for stratigraphic position see Cranberry (Southeast) Section, page 157.

	Ft.	In.
Sandstone, massive .....	..	..
Coal	0	10
Slate, pavement		

Coal Blossom—No. 1111 on Map II.

Richwood District, on road leading north from Richwood, 1.3 miles N. 34° W. of Richwood; **Lower Iaeger Coal**; elevation, 2820' B.

	Ft.	In.
Coal blossom	0	10

¹³Ibid., p. 190.

Coal Blossom—No. 1112 on Map II.

Kentucky District, in road south of Deer Creek, 0.3 mile east of Deepwell; **Lower laeger Coal**; elevation, 1860' B.; for stratigraphic position see Deepwell (Southeast) Section, page 169.

Coal blossom, thickness not determined.

Coal Blossom—No. 1113 on Map II.

Kentucky District, on hill east of Brushy Meadow Creek, 0.5 mile N. 29° E. of White Buck School and 2.7 miles S. 49° E. of Leivasy; **Lower laeger Coal**; elevation, 3000' B.; for stratigraphic position see White Buck Knob Section, page 172.

Coal blossom, thickness not determined.

Coal Blossom—No. 1114 on Map II.

Kentucky District, in road east of Hominy Creek, 1.7 miles south-east of Hominy Falls; **Lower laeger Coal**; elevation, 2640' B.; for stratigraphic position see Coggins Knob Section, page 173.

Coal blossom, thickness not determined.

Allen Cales Prospect—No. 1115 on Map II.

Kentucky District, on hillside east of Hominy Creek, 0.6 mile north-east of Bamboo; **Lower laeger Coal**; elevation, 2750' B.

	Ft.	In.
Sandstone, massive, Middle laeger .....	..	..
Concealed	7	0
Slate, dark	3	0
Coal	1	0
Slate, pavement		

Coal Blossom—No. 1116 on Map II.

Wilderness District, in road at the head of Packlets Creek near Wahoo School, 1.4 miles S. 60° W. of Hominy Mill; **Lower laeger Coal**; elevation, 2500' B.

Coal blossom, thickness not determined.

Dr. James Dunbar Prospect—No. 1117 on Map II.

Wilderness District, on hillside south of Anglins Creek, 1.2 miles S. 41° W. of Runa; **Lower laeger Coal**; elevation, 1980' B.

	Ft.	In.
Fallen shut, coal with some slate, reported.....	1	6

Frank Amick Prospect—No. 1118 on Map II.

Wilderness District, on north side of Anglins Creek, 1.1 miles S. 48° W. of Runa; **Lower laeger Coal**; elevation, 1945' B.

	Ft.	In.
Fallen shut, clean coal, reported	1	6

Samuel Amick Prospect—No. 1119 on Map II.

Wilderness District, on north side of Anglins Creek, 0.7 mile S. 48° W. of Runa; Lower laeager Coal; elevation, 1940' B.

	Ft.	In.
Fallen shut, coal, reported	2	0

Coal Blossom—No. 1120 on Map II.

Wilderness District, along road north of Anglins Creek, 0.7 mile S. 47° W. of Runa; Lower laeager Coal; elevation, 1950' B.

Coal blossom, thickness not determined.

Gauley Coal Land Company Farm Mine—No. 1121 on Map II.

Wilderness District, on a branch of Anglins Creek, 0.7 mile N. 72° E. of Runa; Lower laeager Coal; elevation, 2000' B.

	Ft.	In.
1. Shale, sandy .....	..	..
2. Coal, soft	2	1
3. Slate, pavement		

Coal from the above opening supplies a considerable territory in the vicinity of Runa, its quality being considered satisfactory. A sample (No. 342R) was collected from No. 2 of section, the composition of which is published under Mine No. 1121 in the Survey Table of Coal Analyses at the end of Chapter X.

LOWER IAEGER SANDSTONE.

The Lower Iaeger Sandstone of Hennen¹⁴, named from its occurrence near Iaeger, McDowell County, where it comes in the interval between the Lower Iaeger Coal and Harvey Conglomerate, appears to be but poorly represented in Nicholas, being often replaced by dark or sandy shale, but sometimes occurring as a lenticular, medium-grained, micaceous deposit, 10 to 20 feet in thickness.

LOWER IAEGER SHALE.

The Lower Iaeger Shale of Hennen¹⁵, named from its oc-

¹⁴Ibid., p. 191.

¹⁵Ibid., pp. 191-192.

currence near Iaeger, McDowell County, where it comes just above the Harvey Conglomerate, is apparently present at various localities in southwestern Nicholas, although it is not conspicuous and has no special economic value or scientific interest. It is usually a dark, argillaceous, laminated deposit, varying in thickness from 5 to 10 feet.

HARVEY CONGLOMERATE SANDSTONE.

The **Harvey Conglomerate** of Campbell¹⁶, named from the town of Harvey (now Bolt P. O.), Raleigh County, where it comes 50 to 100 feet below the Nuttall Sandstone, was noted at various points in southern Nicholas in good development. As a rule it is massive or current-bedded, grayish-white or light-brown, coarse-grained and sometimes pebbly, and 10 to 30 feet in thickness, although it frequently occurs in much more massive form in certain localities. In Chapter IV it is recorded in the sections for Anglins Creek, Bamboo, Camden-on-Gauley, Carnifex Ferry, Coggins Knob, Cranberry (West), Deepwell (Northwest), Hominy Falls, Long Point of Gauley, Mt. Lookout, and Orndorff Bridge. So far as known it has not been quarried in the county but its smooth, even texture and durable character would apparently adapt it for massive masonry structures.

SANDY HUFF SHALE.

The **Sandy Huff Shale** of Hennen¹⁷, named from its exposure at the mouth of Sandy Huff Branch, McDowell County, and belonging between the Harvey Conglomerate and the Castle Coal, is represented at various points in southern Nicholas where its horizon outcrops. It is usually dark-gray, argillaceous and laminated, varying in thickness from 2 to 10 feet. In Chapter IV it is noted in the sections for Camden-on-Gauley and Cranberry (West), and on subsequent pages various detailed exposures are noted in connection with the description of the Castle Coal.

¹⁶M. R. Campbell, Raleigh Folio No. 77, U. S. Geol. Survey; 1902.

¹⁷Ray V. Hennen, Wyoming and McDowell Report, W. Va. Geol. Survey, p. 193; 1915.

CASTLE COAL.

The **Castle Coal** of Hennen¹⁸, named from its exposure at the town of Castle, Wyoming County, where it comes directly above the Guyandot Sandstone, and 150 to 175 feet above the Sewell Coal, was noted at various points in southern Nicholas, where its horizon outcrops. In this region its interval above the Sewell Coal varies from 100 to 150 feet, but in the region north of Gauley River where it has been penetrated by a few borings, the same interval is only 50 to 80 feet. As a rule it is single- though sometimes double-bedded, soft and columnar, and varying in thickness from 1 to 2 feet, the former figure being the average. It is apparently absent at various localities and is generally too thin and uncertain to be classed as a commercial seam, but will furnish a limited amount of local domestic fuel in regions where thicker coals do not outcrop. The following exposures and prospects were noted:

Coal Exposure—No. 1122'on Map II.

Jefferson District, along railroad on west bank of Gauley River, 0.6 mile below Peters Creek and 2.6 miles southwestward from Lockwood; **Castle Coal**; elevation, 920' B.

	Ft.	In.
Soil .....	..	..
Coal, soft	1	0
Shale, dark	10	0

Gauley Coal Land Company Prospect—No. 1123 on Map II.

Summersville District, on north side of Gauley River, 1.9 miles N. 41° W. of Mt. Nebo; **Castle Coal**; elevation, 1470' B.

	Ft.	In.
1. Shale, sandy, Sandy Huff	15	0
2. Coal, soft	1'	3"
3. Coal, bony	0	3
4. Coal, soft?	1	0
5. Slate, pavement?		

The exact nature of No. 4 of section is uncertain since it was covered with mud and water. A sample (No. 329R) was collected from No. 2 of section, the composition of which is

¹⁸Ibid., pp. 193-194.

published under Mine No. 1123 in the Survey Table of Coal Analyses at the end of Chapter X.

Coal Exposure—No. 1124 on Map II.

Summersville District, on north side of Gauley River, near **Long Point**, 1.3 miles N. 51° W. of Mt. Nebo; **Castle Coal**; elevation, 1560' B.; for stratigraphic position see Long Point of Gauley Section, page 126.

	Ft.	In.
Coal, soft	1	0

Coal Blossom—No. 1125 on Map II.

Beaver District, in road on south side of Cranberry River, 0.4 mile S. 54° E. of Cranberry; **Castle Coal**; elevation, 2115' B.; for stratigraphic position see Cranberry (Southeast) Section, page 158.

Coal blossom, thickness not determined.

Baltimore & Ohio Railroad Company Exposure—No. 1125A on Map II.

Beaver District, on east side of Gauley River, 1.6 miles northeast of Cranberry Station; **Castle Coal**; elevation, 1980' B.

	Ft.	In.
Sandstone, massive, Harvey	20	0
Concealed and slate	20	0
Coal, slaty	1'	0"
Fire clay shale	2	0
Shale, sandy	2	0
Coal	0	6
Shale, to grade	1	0

V. H. O'Dell Prospect—No. 1126 on Map II.

Richwood District, on north side of Cherry River, 1.0 mile N. 80° W. of Richwood; **Castle Coal**; elevation, 2755' B.; for stratigraphic position see Richwood Section, page 159.

	Ft.	In.
1. Shale, dark, Sandy Huff .....		..
2. Coal, soft	1	5
3. Slate, pavement		

A sample (No. 368R) was collected from No. 2 of section, the composition of which is published under Mine No. 1126 in the Survey Table of Coal Analyses at the end of Chapter X.

Coal Blossom—No. 1127 on Map II.

Kentucky District, in road west of Panther Creek, 1.1 miles

N. 69° E. of Nettie; **Castle Coal**; elevation, 2290' B.; for stratigraphic position see Lowland Section, page 164.

Coal blossom, thickness not determined.

**B. & O. R. R. Company Prospect (John Strader Opening)—
No. 1128 on Map II.**

Kentucky District, on west side of Jims Branch of Panther Creek, 1.0 mile S. 75° E. of Nettie; **Castle Coal**; elevation, 2275' B.

		Ft.	In.
1. Shale, dark, Sandy Huff .....	..	..	..
2. Cannel bone, 1" to	0	7	
3. Coal , soft	2' 0"		
4. Coal , bony	0 5		
5. Coal , soft	0 5	2	10

A sample (No. 360R) was collected from No. 3 of section, the composition of which is published under **Mine No. 1128** in the Survey Table of Coal Analyses at the end of Chapter X. Some doubt exists in the writer's mind as to the proper correlation of the above opening, as its interval from the top of the Lower Nuttall Sandstone (300 feet) is apparently too great for the **Castle** and too small for the **Sewell**, but its cross-section does not correspond to that of the latter seam where it outcrops farther down Panther Creek and it is therefore classified as the **Castle**.

Coal Blossom—No. 1129 on Map II.

Kentucky District, in road north of Hominy Creek, 1.8 miles N. 61° W. of Hominy Mill; **Castle Coal**; elevation, 2305' B.

Coal blossom, thickness not determined.

Coal Exposure—No. 1130 on Map II.

Kentucky District, on road east of Hominy Creek, south of Coggins Knob, and 1.7 miles S. 24° E. of Hominy Falls; **Castle Coal**; elevation, 2605' B.; for stratigraphic position see Coggins Knob Section, page 173.

	Ft.	In.
Coal , visible	1	0
Fire clay and sandy shale		

Coal Blossom—No. 1131 on Map II.

Kentucky District, in road between Hominy and Grassy Meadow Creeks, 0.8 mile N. 67° E. of McClung School and 2.6 miles N. 73° E.

of Bamboo; **Castle Coal**; elevation, 2935' B.
Coal blossom, thickness not determined.

Coal Blossom—No. 1132 on Map II.

Wilderness District, on a branch of Hominy Creek, 0.4 mile N. 57° W. of Hominy Falls; **Castle Coal**; elevation, 2455' B.
Coal blossom, thickness not determined.

Gauley Coal Land Company Exposure—No. 1133 on Map II.

Wilderness District, on south side of Gauley River, 1.5 miles N. 56° W. of Mt. Nebo; **Castle Coal**; elevation, 1485' B.; for stratigraphic position see Rucker Bend Section, page 174.

	Ft.	In.
Shale, dark, Sandy Huff .....		..
Coal , soft, visible, (reported 2' 0")	1	0
Fire clay and sandy shale	25	0

Lewis et al. Prospect—No. 1134 on Map II.

Wilderness District, on east side of Meadow River, 1.7 miles S. 55° W. of Mt. Lookout; **Castle Coal**; elevation, 1645' B.; for stratigraphic position see Mt. Lookout Section, page 178.

	Ft.	In.
Sandstone, massive, Harvey	30	0
Coal , soft	1	9

The above prospect had fallen, shut but a measurement was secured at outcrop and a sample (No. 341R) was collected, the composition of which is published under **Mine No. 1134** in the Survey Table of Coal Analyses at the end of Chapter X.

Coal Blossom—No. 1135 on Map II.

Wilderness District, in road east of Meadow River, 0.4 mile N. 27° E. of Nallen; **Castle Coal**; elevation, 2080' B.; for stratigraphic position see Nallen Section, page 179.
Coal blossom, thickness not determined.

Caleb Dorsey Prospect—No. 1136 on Map II.

Wilderness District, between forks of Dorsey Branch of Anglins Creek, 1.5 miles S. 58° W. of Bruce; **Castle Coal**; elevation, 2240' B.

	Ft.	In.
Sandstone, massive, Harvey .....		..
Coal , mostly concealed by water and mud, reported..	2	4

GUYANDOT SANDSTONE.

The **Guyandot Sandstone** of Campbell¹⁹, named from its exposure near the village of McGraw, Wyoming County, is a well-developed stratum in southern Nicholas. In that region its position is just below the Castle Coal and only a few feet above the Sewell "B", its base coming at an interval of 50 to 80 feet above the Sewell Coal. It is usually very hard, massive, grayish-white, coarse and sometimes pebbly, its thickness varying from 20 to 50 feet. In Chapter IV it is noted in the sections for Anglins Creek, Camden-on-Gauley, Coggins Knob, Cranberry (West), Dogway, Mt. Lookout, Nallen, Richwood, and White Buck Knob. Along Gauley River, where its horizon outcrops, it juts out at many points in a prominent white ledge, although the talus from the Nuttall cliffs sometimes obscures its position, and in the region farther south it becomes a still more conspicuous stratum. In the vicinity of Hominy Falls it apparently coalesces with the Lower Guyandot to form a great ledge 100 to 125 feet in thickness, the outcrop of which, sometimes divided by a break of shale, extends down Hominy to Hominy Mill and up Grassy Creek and other tributaries. Along Hominy Creek above Hominy Falls the same condition largely prevails to the Greenbrier Line, the ledges gradually rising to a somewhat higher position above drainage, and becoming less conspicuous in the hill-sides. Along Cherry and Meadow Rivers it was noted at various points but is far less conspicuous than on Hominy. So far as known the Upper Guyandot has not been quarried in the county but its hard and durable character and smooth, even texture would apparently make it well adapted for massive masonry construction.

SKELT SHALE.

The **Skelt Shale** of the writer²⁰, named from its occurrence along Sugar Creek, Webster County, near Skelt, where it lies between the Guyandot Sandstone and the Sewell "B" Coal, and contains marine fossils, appears in various locali-

¹⁹M. R. Campbell, Raleigh Folio No. 77, U. S. Geol. Survey; 1902.

²⁰D. B. Reger, Webster Report, W. Va. Geol. Survey, p. 108; 1920.

being frequently absent altogether. So far as observed in ties in southern Nicholas. As a rule it is dark, argillaceous and laminated, with a maximum thickness of about 5 feet, the county it contains no fossils but an exhaustive search was not made. Various detailed occurrences are noted in connection with the description of the Sewell "B" Coal on subsequent pages.

SEWELL "B" COAL.

The Sewell "B" Coal of Hennen²¹, named from its occurrence in Wyoming and McDowell Counties, where the statement is made that it belongs almost immediately under the Guyandot Sandstone, appears at certain localities in southern Nicholas where its horizon outcrops. It is generally multiple-bedded, soft and columnar, varying in thickness from 1 to 3 feet, being usually slaty and impure when the latter figure is approached, and often being totally absent over wide areas. It appears to have no prospective value as a commercial seam but may furnish a small amount of local domestic fuel in a few limited regions. Its interval above the Sewell varies from 40 to 80 feet, the following exposures and prospects having been noted:

Coal Blossom—No. 1137 on Map II.

Jefferson District, on north side of Gauley River, 0.9 mile south-east of Vinton; Sewell "B" Coal; elevation, 1145' B.; for stratigraphic position see Panther Mountain Section, page 119.

Coal blossom, thickness not determined.

Coal Blossom—No. 1138 on Map II.

Summersville District, on north side of Gauley River at Long Point, 1.3 miles northwest of Mt. Nebo; Sewell "B" Coal; elevation, 1540' B.; for stratigraphic position see Long Point of Gauley Section, page 126.

Coal, slaty, streak.

Coal Exposure—No. 1139 on Map II.

Beaver District, on hillside north of Gauley River, 1.3 miles N.

²¹Ray V. Hennen, Wyoming and McDowell Report, W. Va. Geol. Survey, pp. 195-196; 1915.

31° W. of Curtin; Sewell "B" Coal; elevation, 1885' B.

	Ft.	In.
Sandstone, massive, cliff, Guyandot	20	0
Coal, estimated	1	0
Fire clay shale and concealed	15	0

The above exposure was estimated by eye from the opposite side of the river.

Baltimore & Ohio R. R. Co. Exposure—No. 1139A on Map II.

Beaver District, on east side of Gauley River, 0.7 mile northeast of Cranberry Station; Sewell "B" Coal; elevation, 1970' B.

	Ft.	In.
Sandstone, great cliff, Guyandot	30	0
Coal	0' 10"	
Shale, sandy, dark, 5' 0" to.....	2	0
Coal	0	11
Fire clay shale	1	0
Sandstone, shaly, to grade	9	0

Chas. Stanley Farm Mine—No. 1140 on Map II.

Beaver District, on hillside north of Cherry River, 0.8 mile N. 45° W. of Dain; Sewell "B" Coal; elevation, 2445' B.

	Ft.	In.
1. Shale, dark, Skelt.....	..	..
2. Coal, soft, columnar	1	9
3. Slate, pavement		

Although only a thin seam at this point, the above opening was being operated for wagon trade in the vicinity of Dain and Richwood, the daily output being 2 tons. A sample (No. 361R) was collected from No. 3 of section, the composition of which is published under Mine No. 1140 in the Survey Table of Coal Analyses at the end of Chapter X.

Coal Prospect—No. 1141 on Map II.

Kentucky District, on hillside west of Gauley River, 1.1 miles N. 36° W. of Curtin; Sewell "B" Coal; elevation, 1930' B.

Coal blossom, at old prospect, thickness unknown.

Coal Blossom—No. 1142 on Map II.

Kentucky District, on hillside west of Gauley River, 1.0 mile N. 38° W. of Curtin; Sewell "B" Coal; elevation, 1930' B.

	Ft.	In.
Soil .....	..	..
Coal blossom	0	6
Fire clay shale	4	0
Sandstone, massive, Lower Guyandot		

Coal Blossom—No. 1143 on Map II.

Kentucky District, on hillside west of Gauley River, 0.8 mile N. 54° W. of Curtin; Sewell "B" Coal; elevation, 1950' B.
Coal blossom, thickness not determined.

Coal Exposure—No. 1144 on Map II.

Kentucky District, on hillside west of Cherry River, 0.2 mile N. 68° W. of Coal Siding; Sewell "B" Coal; elevation, 2050' B.

	Ft.	In.
Sandstone, massive cliff, Guyandot?, 50' 0" to.....	60	0
Concealed and shale, Skelt	49	0
Coal	1	0
Slate and concealed		

Coal Blossom—No. 1145 on Map II.

Richwood District, on north side of Cherry River, 0.5 mile north-west of Richwood; Sewell "B" Coal; elevation, 2710' B.; for stratigraphic position see Richwood Section, page 159.

	Ft.	In.
Coal blossom, visible	0	6

Gauley Coal Land Company Prospect—No. 1146 on Map II.

Wilderness District, on the west side of Anglins Creek, 2.4 miles S. 62° W. of Bamboo; Sewell "B" Coal; elevation, 2810' B.

	Ft.	In.
Shale, black, Skelt .....	..	..
Coal, bony	0' 3"	
Coal, soft	1	11
Slate, pavement		

John Raine Prospect—No. 1147 on Map II.

Wilderness District, on hillside north of Back Creek, 1.7 miles S. 16° W. of Bamboo; Sewell "B" Coal; elevation, 2795' B.

	Ft.	In.
Fallen shut, coal, reported 1' 0" to.....	1	4

SEWELL "A" COAL.

The Sewell "A" Coal of Hennen²², named from its occur-

²²Ibid., p. 196.

rence in Wyoming and McDowell Counties, where it was noted at a few points, its position being 20 to 30 feet below the Sewell "B" Coal, and almost immediately above the Lower Guyandot Sandstone, was observed at only a few points in Nicholas, being represented only by a thin blossom, and being of value only as a stratigraphic marker. The following exposures were noted:

Coal Blossom—No. 1148 on Map II.

Jefferson District, on north side of Gauley River, 0.9 mile southeast of Vinton; Sewell "A" Coal; elevation, 1130' B.; for stratigraphic position see Panther Mountain Section, page 119.

Coal blossom, thickness not determined.

Coal Blossom—No. 1149 on Map II.

Summersville District, on north side of Gauley River at Long Point, 1.3 miles northwest of Mt. Nebo; Sewell "A" Coal; elevation, 1530' B.; for stratigraphic position see Long Point of Gauley Section, page 126.

Coal, streak.

Coal Blossom—No. 1150 on Map II.

Richwood District, on north side of Cherry River, 0.4 mile northwest of Richwood; Sewell "A" Coal; elevation, 2675' B.; for stratigraphic position see Richwood Section, page 159.

Coal blossom, thickness not determined.

LOWER GUYANDOT SANDSTONE.

The Lower Guyandot Sandstone of Hennen²³, named from its occurrence in Wyoming and McDowell Counties, where it comes only a few feet above the Sewell Coal, is present generally in southern Nicholas where its horizon outcrops. As a rule it is massive, grayish-white, coarse and sometimes pebbly, very hard, and varying in thickness from 10 to 30 feet, although in places it is 50 feet or more. In Chapter IV it is recorded in the sections for Bamboo, Camden-on-Gauley, Carnifex Ferry, Coggins Knob, Cranberry (Southeast), Dogway, Fenwick, Fury Knob, Nallen, Richwood, and Russellville. Along Gauley River the sandstone outcrops prominently at numerous points, its horizon being above

²³Ibid., pp. 196-197.

drainage for many miles. South of Gauley it is conspicuous both on Cherry and Meadow Rivers and, on Hominy Creek, as previously noted under the description of the Guyandot Sandstone, page 331, it coalesces into a single great ledge at numerous points in the vicinity of Hominy Falls. Its lower portion forms the cataract at the village, the drop being fifteen feet, and the same portion of the ledge is responsible for Grassy Falls on Grassy Creek, the height being 10 feet. Farther south from Hominy Falls it rises to a somewhat higher position above drainage, its outcrop becoming less conspicuous. So far as known it has not been quarried in the county, but its firm and durable character and smooth, even grain would seem to adapt it well for massive masonry construction.

HARTRIDGE BLACK SHALE.

The **Hartridge Black Shale** of the writer²⁴, named from its occurrence at the mining village of Hartridge, Randolph County, where it is characterized by *Naiadites elongata* fossils in profusion, is generally present in southern Nicholas where its horizon outcrops, being absent at infrequent points. As a rule it is dark, argillaceous or sandy, laminated, with frequent ferruginous nodules, usually contains plant fossils and frequently carries a brackish-water fauna, similar to that of its type locality. Numerous detailed exposures are recorded in Chapter X, under the description of the Sewell Coal, the position of the shale being between that seam and the Lower Guyandot Sandstone.

SEWELL (SHARON) COAL.

The **Sewell Coal** of White²⁵, named from Sewell Mountain, Fayette County, where it has long been mined, and belonging in that locality about 300 feet below the Nuttall Sandstones and 60 to 80 feet above the Upper Raleigh Sand-

²⁴D. B. Reger, Barbour, Upshur and Western Portion of Randolph Report, W. Va. Geol. Survey, pp. 288-290; 1918.

²⁵I. C. White, The Virginias, pp. 7-16; January, 1885; Bull. 65, U. S. Geol. Survey, p. 197; 1891; and Vol. II, W. Va. Geol. Survey, pp. 657-665; 1903.



PLATE XV.—Lower Dotson Sandstone at mouth of Buck Garden Creek, near Gilboa.

Photo by E. E. Harris.

stone, is a well-developed seam in southern Nicholas where its horizon outcrops, being the most valuable of all the coals of the New River Group. In this portion of the county its position is from 200 to 300 feet below the base of the Lower Nuttall Sandstone and from 150 to 250 feet above the Mauch Chunk Red Shales. North of Gauley River, where information concerning it is available only through scanty borings or oil well records, its interval below the Lower Nuttall diminishes rapidly, being sometimes less than 150 feet in the northeastern portion of the county, the coal itself having mostly disappeared.

In the region of its outcrop the coal is single- or double-bedded, soft and columnar, with a very low content of sulphur, ash and phosphorus, and low in volatile matter, its thickness ranging from 2 to 6 feet. Rising above drainage $3\frac{1}{2}$ miles southeast of Swiss, it is exposed at various localities along Gauley River as far up as Cranberry Station where it goes under the river on the northward dip, being partly below and partly above water-level within the limits named. On Meadow River it is above drainage at only infrequent points. On Hominy Creek it rises above water-level 4.5 miles from the mouth of the stream and so remains to the Greenbrier County Line, being exposed both on the main creek and on several of its larger tributaries. On Cherry River it rises above drainage at Curtin and remains above water-level to the Greenbrier and Pocahontas County Lines, being exposed on various tributaries. It is also above drainage on portions of Panther Creek. It is being mined commercially at Saxman, and for railroad fuel for logging trains at certain points on Gauley River and Panther Creek.

Such borings and oil well records as are available in that portion of the county lying north of Gauley indicate that the coal is mainly absent or too thin for commercial mining in the northern edge but gradually thickens to apparent commercial dimensions in going southward. In the southern portion of the county where it crops this seam has been used as the base for the red structure contours shown on Map II, and on the same map its outcrop is delineated. In Chapter X it will be discussed in full, with numerous bed-sections,

chemical analyses, and an estimate of its areal extent and probable tonnage.

As indicated in previous Reports²⁶, it is the belief of the writer that the Sewell is the same as the **Sharon Coal** of western Pennsylvania, since he has personally traced it from the Fayette-Nicholas County Line all the way to the West Virginia-Pennsylvania State Line at the northern boundary of Preston County, the detailed regions of outcrop being mentioned in the Webster Report cited above. This view coincides with an early deduction advanced many years ago by Dr. David White, Chief Geologist of the United States Geological Survey, based on the evidence of fossil plants in the roof shales.

WELCH SANDSTONE.

The **Welch Sandstone** of Henuer²⁷, named from its occurrence at the town of Welch, McDowell County, and coming between the Sewell and Welch Coals, is present in the measures of Nicholas, but is not an especially prominent horizon. As a rule it is massive, grayish-white, and 10 to 30 feet in thickness, but is sometimes micaceous and shaly or altogether replaced by sandy or dark shale. In Chapter IV it is noted in the sections for Camden-on-Gauley, Cranberry (Southeast), Deepwell (Northwest), Fury Knob, and Panther Mountain. So far as known it has not been quarried in the county, and owing to its frequent shaly character its general use as a building stone would not be well advised.

WELCH COAL.

The **Welch Coal** of White²⁸, named from its occurrence near Welch, McDowell County, where it belongs 60 to 70 feet below the Sewell Coal and 0 to 10 feet above the Upper Raleigh Sandstone, appears to be only poorly represented in

²⁶D. B. Reger, Barbour, Upshur and Western Portion of Randolph Report, W. Va. Geol. Survey, pp. 266 and 291; 1918; and Webster Report, W. Va. Geol. Survey, p. 204; 1920.

²⁷Ray V. Hennen, Wyoming and McDowell Report, W. Va. Geol. Survey, pp. 198-199; 1915.

²⁸I. C. White, Vol. II, W. Va. Geol. Survey, pp. 666-667; 1903.

Nicholas. In the region of its outcrop in the southern half of the county it was noted occasionally, as a soft, columnar, single- or double-bedded coal, varying in thickness from 0 to 2 feet, and coming at an interval of 30 to 60 feet below the Sewell, and only a few feet below the Welch Sandstone. Unless further prospecting, or borings in regions where it is underground, should reveal more encouraging evidence it must be classed as a non-commercial seam and capable of furnishing only a small amount of local domestic fuel. The following exposures and prospects were noted:

Coal Blossom—No. 1247 on Map II.

Beaver District, on hillside east of Cherry River, 0.2 mile S. 68° E. of Fenwick; **Welch Coal**; elevation, 2325' B.

	Ft.	In.
Coal blossom, visible	1	0

Coal Blossom—No. 1248 on Map II.

Richwood District, on hillside west of North Fork of Cherry River, 0.5 mile N. 33° W. of Richwood; **Welch Coal**; elevation, 2495' B.

	Ft.	In.
Sandstone, Welch	15	0
Coal blossom, thickness not determined.....		

A. L. Craig Prospect—No. 1249 on Map II.

Richwood District, on hillside south of Cherry River, just south of Richwood; **Welch Coal**; elevation, 2500' B.

	Ft.	In.
Shale, dark .....	..	..
Coal, soft	1	1
Slate, pavement		

Craig-Deitz Coal Company Prospect—No. 1250 on Map II.

Kentucky District, on hillside west of Cherry River, 1.1 miles N. 41° W. of Fenwick; **Welch Coal**; elevation, 2225' B.

	Ft.	In.
Shale, dark	7	0
Coal	0	10
Slate, pavement		

Craig-Deitz Coal Company Prospect—No. 1251 on Map II.

Kentucky District, on hillside west of Cherry River, 0.2 mile north-west of Fenwick; **Welch Coal**; elevation, 2335' B.

	Ft.	In.
Coal, about	0	8

Coal Blossom—No. 1252 on Map II.

In Greenbrier County, on hillside north of McMillion Creek, 2.0 miles S. 21° E. of Eureka School and 4.4 miles S. 7° W. of Saxman; **Welch Coal**; elevation, 3120' B.

Spring, with slate and coal blossom, thickness not determined.

Coal Blossom—No. 1253 on Map II.

Wilderness District, on road north of Miller Creek, 0.4 mile S. 60° E. of Nallen; **Welch Coal**; elevation, 1930' B.

Coal blossom, at spring, thickness not determined.

UPPER RALEIGH (SHARON) SANDSTONE.

The **Upper Raleigh Sandstone** of White²⁹, named from its occurrence in northeastern Raleigh County, and being the upper division of the **Raleigh Sandstone** of Campbell³⁰, is a well-marked horizon in Nicholas.

As a rule it is massive, grayish-white, hard, coarse and often pebbly, its thickness varying from 50 to 75 feet, and its top coming 40 to 70 feet below the Sewell Coal and only a few feet below the Welch Coal when the latter is present. In Chapter IV it is noted in the sections for Camden-on-Gauley, Coggins Knob, Hookersville, Persinger Ford (South), Richwood, Russellville, and White Buck Knob. Along the southern edge of the county where it outcrops it is a prominent ledge, forming noticeable cliffs along Hominy Creek south of Hominy Falls and on Cherry River in the vicinity of Richwood and farther up North Fork. On Gauley River it is above drainage only in the vicinity of the Mann Mountain Anticline, its outcrop forming a prominent cliff just above water-level for a mile or more on either side of the axis of that fold. So far as known it has not been quarried in the county but its hard and durable character and smooth, even texture would adapt it well for heavy masonry construction.

As stated in previous Reports³¹, it is the belief of the

²⁹I. C. White, Vol. II(A), W. Va. Geol. Survey, p. 198; 1908.

³⁰M. R. Campbell, Raleigh Folio No. 77, U. S. Geol. Survey; 1902.

³¹D. B. Reger, Barbour, Upshur and Western Portion of Randolph Report, W. Va. Geol. Survey, pp. 292-293; 1918; and Webster Report, W. Va. Geol. Survey, p. 206; 1920.

writer, after extensive field studies, that the Upper Raleigh Sandstone is identical with the **Sharon Conglomerate** of western Pennsylvania, the evidence being apparently conclusive.

The **Little Raleigh "A" Coal** of Krebs³², named from its occurrence in Raleigh County, where it comes just below the Upper Raleigh Sandstone and 10 to 20 feet above the Little Raleigh Coal, was not observed in Nicholas, having evidently disappeared in the northeastward thinning of the measures.

LITTLE RALEIGH COAL.

The **Little Raleigh Coal** of White³³, named from its occurrence in Raleigh County where it comes in the interval separating the Upper and Lower Raleigh Sandstones, was seldom observed in Nicholas, being apparently absent at nearly all points where its horizon outcrops. The following was the only prospect noted:

Coal Prospect—No. 1254 on Map II.

Wilderness District, on hillside west of Hominy Creek, 0.7 mile S. 43° E. of Bamboo; **Little Raleigh Coal**; elevation, 2465' B.
Fallen shut, thickness unknown.

LOWER RALEIGH SANDSTONE.

The **Lower Raleigh Sandstone** of White³⁴, named from its occurrence in northeastern Raleigh County, where it comes a few feet below the Little Raleigh Coal and being the lower division of the **Raleigh Sandstone** of Campbell³⁵, was seldom observed in Nicholas, but apparently makes its appearance in the measures at a few points. When present it is massive, gray and lenticular, varying in thickness from 0 to 40 feet. In Chapter IV it is recorded in the sections for Big Spruce Knob, Dogway, Hominy Falls, Hookersville, and Russellville, two of which are outside the limits of the county. On Hominy Creek near the Greenbrier County Line it was questionably identified at a few points. So far as known it has

³²C. E. Krebs, Raleigh Report, W. Va. Geol. Survey, pp. 322 and 361; 1916.

³³I. C. White, Vol. II(A), W. Va. Geol. Survey, pp. 198-199; 1908.

³⁴Ibid., pp. 198-199.

³⁵M. R. Campbell, Raleigh Folio No. 77, U. S. Geol. Survey; 1902.

not been quarried in the county.

The **Beckley "Rider" Coal** of Krebs³⁶, named from its occurrence in Raleigh County, where it is described as coming just under the Lower Raleigh Sandstone, was not observed in Nicholas, having apparently disappeared in the northeastward thinning of the measures.

BECKLEY COAL.

The **Beckley Coal** of Campbell³⁷, described in more detail by White³⁸, and named from its occurrence in Raleigh County, where it has long been mined commercially on an extensive scale, was observed at a few points in Nicholas, but apparently is much inferior to the fine development at its type locality. As a rule it is multiple-bedded, soft and columnar, varying in thickness from 1 to 3 feet, its position being just below the Lower Raleigh Sandstone when that member is present, but as this sandstone, as well as the Little Raleigh and Little Raleigh "A" Coals are usually absent, the Beckley is more often found only a few feet below the Upper Raleigh Sandstone. Its interval below the Sewell Coal in southern Nicholas, where its horizon outcrops, varies from 160 to 275 feet, the larger figure being named for the extreme southwestern corner of the county, where the measures have thickened considerably. Definite information is not available to justify the classification of this coal as a commercial seam. If its showing at the various outcrops noted above drainage were alone considered it should be discarded as too thin, slaty or lenticular for mining but it may be possible that borings in the southwestern corner of the county may in the future reveal limited areas of minable coal. In the section for Hominy Falls, page 175, it is recorded in an oil well record (No. 31 on Map II), as being 5 feet thick, but as a churn drill record is seldom accurate in small details too much dependence should not be placed on this showing. Even if the Beckley Coal should not prove to be commercially minable, however,

³⁶C. E. Krebs, Raleigh Report, W. Va. Geol. Survey, p. 362; 1916.

³⁷M. R. Campbell, Raleigh Folio No. 77, U. S. Geol. Survey; 1902.

³⁸I. C. White, W. Va. Geol. Survey, Vol. II, pp. 667-668; 1903; and Vol. II(A), pp. 186-195; 1908.

it will furnish local domestic fuel in certain localities. The following exposures and prospects were noted:

**Kanawha & Michigan Railway Company Exposure—
No. 1255 on Map II.**

Jefferson District, along railroad on north bank of Gauley River at mouth of Beech Run, 3.9 miles S. 66° E. of Swiss; **Beckley Coal**; elevation, 875' B.

	Ft.	In.
Sandstone, massive, cliff, Upper Raleigh	60	0
Coal , soft	2	7
Shale, dark	0	4
Fire clay shale	5	0

**Kanawha & Michigan Railway Company Exposure—
No. 1256 on Map II.**

Jefferson District, along railroad on north bank of Gauley River, 0.5 mile above Beech Run and 4.4 miles S. 68° E. of Swiss; **Beckley Coal**; elevation, 865' B.

	Ft.	In.
Sandstone, great cliff, Upper Raleigh	60	0
Coal , lenticular, 0' 0" to.....	1	0
Shale, gray	15	0

Coal Blossom—No. 1257 on Map II.

Beaver District, on hillside north of Cherry River, 0.6 mile S. 60° E. of Fenwick; **Beckley Coal**; elevation, 2240' B.; for stratigraphic position see Fenwick Section, page 162.

Coal blossom, thickness not determined.

Coal Blossom—No. 1258 on Map II.

Beaver District, on hillside north of Cherry River, 0.8 mile N. 60° W. of Dain; **Beckley Coal**; elevation, 2300' B.

Coal blossom, thickness not determined.

Coal Blossom—No. 1259 on Map II.

Richwood District, on hillside north of North Fork of Cherry River, 0.1 mile north of Richwood; **Beckley Coal**; elevation, 2390' B.

Coal blossom, thickness not determined.

Coal Exposure—No. 1260 on Map II.

Glade District, Webster County, on west side of Dogway Fork of Cranberry River, 0.5 mile north of Dogway; **Beckley Coal**; elevation, 3080' B.

	Ft.	In.
Sandstone, shaly .....	..	..
Coal, 1' 0" to	1	6
Shale, dark, Quinnimont, to Fire Creek Coal	20	0

Coal Exposure—No. 1261 on Map II.

Kentucky District, in railroad cut at mouth of Mill Branch of Cherry River, just west of Holcomb; **Beckley Coal**; elevation, 2060' B.

	Ft.	In.
Shale, dark .....	..	..
Coal, slaty, about.....	1	0
Shale, dark, sandy, to grade	15	0

Coal Prospect—No. 1262 on Map II.

Kentucky District, on west bank of Cherry River, 1.1 miles N. 39° W. of Fenwick; **Beckley Coal**; elevation, 2150' B.

	Ft.	In.
Shale, sandy	5	0
Coal	0	5
Slate, black .....	..	..

Levi Lilly Heirs Farm Mine—No. 1263 on Map II.

Greenbrier County, on hillside north of McMillion Creek, 2.1 miles S. 30° E. of Eureka School and 4.5 miles southwestward from Saxman; **Beckley Coal**; elevation, 3015' B.

	Ft.	In.
Sandstone, massive .....	..	..
Coal, soft	1' 4"	..
Coal, bony	0 8	2 0
Slate, bony	2	0

T. B. Lilly Farm Mine—No. 1264 on Map II.

Greenbrier County, on north side of McMillion Creek, 2.4 miles S. 9° E. of Eureka School and 5.3 miles southwest of Saxman; **Beckley Coal**; elevation, 3040' B.

	Ft.	In.
Fallen shut, coal, reported 3' 0" to.....	4	0

QUINNIMONT SANDSTONE.

The **Quinnimont Sandstone** of White³⁹, named from the town of Quinnimont, Fayette County, where it comes just under the **Beckley Coal**, was questionably identified at a few

³⁹I. C. White, Vol. II(A), W. Va. Geol. Survey, p. 13; 1908.

points in Nicholas, but in most localities appears to be absent. In Chapter IV it is recorded in the sections for Fury Knob and Deepwell (Northwest), being gray, massive and 20 to 35 feet thick. It was observed also on Laurel and Little Laurel Creeks, tributary to Cherry River, some of the exposures being in the edge of Greenbrier County, and on McMillion Creek in the edge of the same county.

QUINNIMONT SHALE.

The **Quinnimont Shale** of Campbell⁴⁰, named from the town of Quinnimont, Fayette County, where it occupies the interval between the Quinnimont Sandstone and the Fire Creek (Quinnimont) Coal, crops over only a limited area in southern Nicholas and was seldom identified. In Chapter IV it is recorded in the sections for Dogway and Russellville, being 20 to 40 feet thick and black in color.

FIRE CREEK (QUINNIMONT) COAL.

The **Fire Creek (Quinnimont) Coal** of White⁴¹, named from its occurrence in the vicinity of Fire Creek and Quinnimont, Fayette County, where it has been mined commercially on an extensive scale, seems to be present in certain limited areas in southern Nicholas, but is not generally prevalent, its region of best development being in the vicinity of Richwood and westward through a narrow belt next to the Greenbrier County Line. As a rule it is soft, columnar, multiple-bedded, varying in thickness from 0 to 5 feet, its position being immediately below the Quinnimont Sandstone, but as the latter member is frequently absent and its interval below the Sewell Coal varies from 200 to 350 feet, its identification should be mainly based on its distance above the red Mauch Chunk Shales which usually occur a few feet below it. Its bed-section is usually characterized by a black slate or bony parting, coming near the middle of the seam. In Chapter X its character, areal extent, and thickness, together with detailed bed-sections and an estimate of its probable tonnage will be

⁴⁰M. R. Campbell, Raleigh Folio No. 77, U. S. Geol. Survey; 1902.

⁴¹I. C. White, Bull. 65, U. S. Geol. Survey, p. 197; 1891; and Vol. II(A), W. Va. Geol. Survey, pp. 179-185; 1908.

discussed, under the subject of "Commercial Coal", and its outcrop is delineated on Map II.

LITTLE FIRE CREEK COAL.

The **Little Fire Creek Coal** of White⁴², named from its occurrence in Raleigh County where it is described as coming 20 to 40 feet below the Fire Creek Coal, was identified at a few points in southern Nicholas, but is apparently worthless from an economic standpoint, being of value mainly as a stratigraphic marker. It is soft and columnar, and usually less than one foot in thickness, its position being from 10 to 30 feet below the Fire Creek Coal, and in most instances just above the red shales. The following exposures were noted:

Coal Exposure—No. 1281 on Map II.

Richwood District, on hillside west of Little Laurel Creek, 0.7 mile south of Dain; **Little Fire Creek Coal**; elevation, 2250' B.

	Ft.	In.
Sandstone, massive, cliff	15	0
Coal and slate	2	6
Shale, sandy	8	0

Coal Exposure—No. 1282 on Map II.

Richwood District, on north bank of Cherry River, 0.1 mile north of Dain; **Little Fire Creek Coal**; elevation, 2170' B.

	Ft.	In.
Sandstone, shaly	15	0
Shale, dark, with sandy streaks.....	5	0
Coal, visible	1	0

Coal Exposure—No. 1283 on Map II.

Richwood District, on south side of Cherry River, in west end of Richwood; **Little Fire Creek Coal**; elevation, 2215' B.

	Ft.	In.
Sandstone, massive	10	0
Coal, slaty	0	6

Coal Exposure—No. 1284 on Map II.

Richwood District, on hillside south of North Fork of Cherry River, 2.0 miles N. 19° E. of Richwood; **Little Fire Creek Coal**; eleva-

⁴²I. C. White, Vol. II(A), W. Va. Geol. Survey, pp. 22 and 25; 1908.

tion, 2415' B.

	Ft.	In.
Shale, sandy, dark, partly concealed	25	0
Coal	1	0
Shale, dark, with ferruginous nodules	12	0

PINEVILLE SANDSTONE.

The **Pineville Sandstone** of Hennen⁴³, named from its occurrence at Pineville, Wyoming County, where it is described as coming directly above the No. 9 Pocahontas Coal, appears to be present in a few localities in southern Nicholas. As a rule it is massive, grayish-white, coarse-grained, and lenticular, varying in thickness from 0 to 35 feet, its position being just below the horizon of the Little Fire Creek Coal. In Chapter IV it is recorded in the sections for Camden-on-Gauley, Fury Knob, Hominy Falls, Orndorff Bridge, Persinger Ford (South), Richwood, Russellville, and White Buck Knob, its identification having been made mainly from borings, as its outcrop is limited to a few localities on the waters of Hominy Creek, above and below Hominy Falls, and on Cherry River and tributaries in the vicinity of Richwood. So far as known it has not been quarried in the county.

The **No. 9 Pocahontas Coal** and **No. 8 Pocahontas Coal of White**⁴⁴, described in more detail by Hennen⁴⁵, and coming below the Pineville Sandstone in the order named, were not observed above drainage in Nicholas and do not appear in any of the bore hole records of the southern portion of the county, and have probably disappeared from the measures.

GENERAL DESCRIPTION, POCAHONTAS GROUP.

The **Pocahontas Group** or **Lower Pottsville** of White⁴⁶, named from its occurrence in southern West Virginia and northwestern Virginia, where it is described as starting at the top of the Flattop Mountain Sandstone and extending down-

⁴³Ray V. Hennen, Wyoming and McDowell Report, W. Va. Geol. Survey, pp. 211-212; 1915.

⁴⁴I. C. White, Vol. II(A), W. Va. Geol. Survey, pp. 102 and 177; 1908.

⁴⁵Ray V. Hennen, Wyoming and McDowell Report, W. Va. Geol. Survey, pp. 212-213, and 213-214; 1915.

⁴⁶I. C. White, Vol. II(A), W. Va. Geol. Survey, p. 13; 1908.

ward to the red Mauch Chunk Shales, has almost totally disappeared in Nicholas. In the vicinity of Richwood, where the Mauch Chunk reds are above drainage, no vestige of these rocks and coals could be found, but at Deepwell, Kentucky District, certain borings reveal approximately 600 feet of sandstones and shales below the undoubted Sewell Coal and above the red shales, some of which apparently belong in the Pocahontas Group. At Hominy Falls, where a deep oil well record is available, what is apparently the Pineville Sandstone of the New River Group rests directly on the red shales, but at Russellville, Fayette County, two miles south of the southwest corner of Nicholas, certain members of the Pocahontas Group appear in the record of a boring which did not reach the red shales.

The Pocahontas Group, as described in the locality of its best development in southern West Virginia, consists of sandstones and sandy shales, alternating with several seams of soft, pure coal, some of which have been mined extensively. In Nicholas County it appears that the coals have almost entirely, if not totally, disappeared, leaving only a few sandstones and shales that have a lenticular development in restricted localities, those which occur being listed in the General Section of the Pottsville, page 211.

DESCRIPTION OF MEMBERS, POCAHONTAS GROUP.

FLATTOP MOUNTAIN SANDSTONE.

The Flattop Mountain Sandstone of White⁴⁷, named from its occurrence on the summit of Flattop Mountain, 2 miles northwest of Pocahontas, Virginia, and coming at the top of the Pocahontas Group, is apparently represented at Deepwell, being 40 feet thick, hard and white, as recorded in the section for Deepwell (Northwest), page 167, and 38 feet 2 inches in the section for Fury Knob, page 171. It is also recorded in the section for Russellville, page 181.

⁴⁷I. C. White, Vol. II(A), W. Va. Geol. Survey, pp. 13-14; 1908.

RIFT SHALE.

The **Rift Shale** of Hennen⁴⁸, described as belonging between the Flattop Mountain Sandstone and the No. 7 Pocahontas Coal, is apparently represented at Deepwell, being recorded as dark in color and 20 feet thick in the section for Deepwell (Northwest), and as light and sandy and 30' 5" thick in the section for Fury Knob. In the section for Russellville it also appears as a dark, sandy member, 5' 9" thick.

The **No. 7 Pocahontas Coal** of White⁴⁹, named from its occurrence near Pocahontas, Virginia, and belonging between the Rift Shale and Pierpont Sandstone, does not appear in the measures either at Deepwell or Russellville, and it seems probable that it is not present in the county.

PIERPONT SANDSTONE.

The **Pierpont Sandstone** of Hennen⁵⁰, named from its occurrence at Pierpont, Wyoming County, where it is described as coming between the No. 7 Pocahontas and No. 6 Pocahontas Coals, is apparently represented at Deepwell, being recorded as 65 feet thick in the section for Deepwell (Northwest) and 60' 3" in that for Fury Knob. In the section for Russellville it is recorded as 9' 4" thick.

ROYAL SHALE.

The **Royal Shale** of Krebs⁵¹, named from its occurrence at Royal, Raleigh County, where it is described as a fossiliferous shale constituting the roof of the No. 6 Pocahontas Coal, is apparently represented at Deepwell, being recorded as 9 feet thick and black in color in the section for Deepwell (Northwest), and 26' 6" and sandy, in that for Fury Knob. At Russellville it is recorded as a black slate, 1' 1" thick, coming just over the No. 6 Pocahontas Coal.

⁴⁸Ray V. Hennen, Wyoming and McDowell Report, W. Va. Geol. Survey, p. 217; 1915.

⁴⁹I. C. White, Vol. II(A), W. Va. Geol. Survey, pp. 102-104; 1908.

⁵⁰Ray V. Hennen, Wyoming and McDowell Report, W. Va. Geol. Survey, pp. 218-219; 1915.

⁵¹C. E. Krebs, Raleigh Report, W. Va. Geol. Survey, pp. 366-367; 1916.

NO. 6 POCAHONTAS COAL.

The **No. 6 Pocahontas Coal** of White⁵², named from its occurrence at Pocahontas, Virginia, and belonging between the Royal Shale and Eckman Sandstone, is not recorded in the borings at Deepwell, but in the section for Russellville, page 181, there is a coal 2' 5" thick which may represent it or may be the No. 3 Pocahontas, as is inferred in parentheses by Mr. Hennen, its interval below the Sewell Coal being approximately 500 feet. Whether this coal extends into Nicholas County is a matter of mere conjecture as no borings are available in the region where it might be expected. In any case it seems probable that it would be too thin and lenticular for mining.

ECKMAN SANDSTONE.

The **Eckman Sandstone** of Hennen⁵³, named from its occurrence at Eckman, McDowell County, where it is described as coming a short distance below the No. 6 Pocahontas Coal, is apparently represented at Deepwell in the section for Fury Knob, being 30' 4" thick. The section for Deepwell (North-west) does not record it and the boring at Russellville did not pierce its horizon.

⁵²I. C. White, Vol. II(A), W. Va. Geol. Survey, pp. 103-104; 1908.

⁵³Ray V. Hennen, Wyoming and McDowell Report, W. Va. Geol. Survey, pp. 221-223; 1915.

CHAPTER VIII.

STRATIGRAPHY--MAUCH CHUNK SERIES.

GENERAL ACCOUNT AND SECTION.

The **Mauch Chunk Series**, composing the upper division of the Mississippian Rocks, named from its occurrence near the city of Mauch Chunk in eastern Pennsylvania, and coming just below the Pottsville, is the lowest outcropping series in Nicholas County. Its only exposure is along Cherry River and its two main forks. On the main river the southeastward rise of the rocks brings the top of the series above drainage within the limits of the city of Richwood and it so remains up the river to the forks and up South Fork to the Greenbrier County Line, a distance of two miles, where there is approximately 450 feet of it exposed. On North Fork of Cherry, above Richwood, the northward bend of the stream causes its top to dip below drainage near the city limits, but three miles above the forks of the river it appears again, as exposed by the southeastward rise, and remains above drainage to the Greenbrier County Line, the length of this exposure being $2\frac{1}{2}$ miles and there being approximately 300 feet of the series exposed at the last-named point. Elsewhere in the county the Mauch Chunk was not observed but it is possible that a few feet of it may be above drainage at the point where the Nicholas-Greenbrier Line crosses Laurel Creek of Cherry River, several miles south of Saxman, it being doubtful whether the red soil in this vicinity was residual or transported from farther up the stream.

In Webster and Pocahontas Counties, both lying east of Nicholas, where the Mauch Chunk Series is exposed in full, it is composed mainly of red and green shales, interstratified with lenticular sandstones, most of which are green, fine-grained, flaggy and lenticular or shaly, with a large sprinkling of mica. Near the top of the series there is also a huge,

bedded conglomerate, and near its base there is another massive gray sandstone, quite different from the general type. The series also contains, in the region mentioned, two thin and lenticular streaks of coal and two well-defined marine fossiliferous limestones. In Nicholas County, where the main portion of the series is below drainage, its upper portion is very similar to its counterpart in the counties named, but its middle and lower portions are known only through the records of a few borings and can not be closely described. The maximum thickness in the county most probably occurs along the line that joins Nicholas to Greenbrier and Pocahontas Counties. No boring has been made through it in the vicinity of Richwood but at Hominy Falls, several miles farther west, it has a thickness of 1418 feet, as shown by the section for that point, page 176, and at Deepwell, several miles north of Hominy Falls, but south of Gauley River, it is only 915 feet, as exhibited in the section for Deepwell (Northwest), pages 167-8. Farther north at the foot of Powell Mountain the section for Hookersville, page 149, shows it to be 585 feet, and the section for Dille, page 137, located on the western side of Powell Mountain, along the Nicholas-Braxton Line, records only 370 feet. It seems probable that the series would have a maximum thickness of approximately 1600 feet in the vicinity of Richwood, and if this be true its minimum of 370 feet at Dille represents only 23 per cent. of its maximum at the former locality.

The following general section, published in a previous Report¹, and covering the region of southern Webster and western Pocahontas Counties, should be closely applicable to the vicinity of Richwood and the southern edge of Nicholas, as well as the northern portion of Greenbrier County:

**General Section of the Mauch Chunk Series for Southern
Webster, Southern Nicholas, Western Pocahontas
and Northern Greenbrier Counties.**

	Thickness.	Total.
	Feet.	Feet.
Shale, red or green	50 to 100	100
Sandstone, Princeton Conglomerate, green-		

¹D. B. Reger, Webster Report, W. Va. Geol. Survey, p. 214; 1920.

	Thickness. Feet.	Total. Feet.	
ish-gray, very hard and pebbly, great conglomerate of upper Elk, upper Gauley, upper Williams, upper Cranberry and of Cherry River above Richwood	30 to 150	250	250'
Limestone, Terry, shaly and lenticular, usually contains marine fossils in profusion	0 to 5	255	
Shale, variegated and sandy, lenticular...	0 to 5	260	
Shale, Pluto, dark, carbonaceous, lenticular, sometimes cherty, with plant or marine fossils	0 to 4	264	
Coal, Pluto, soft, lenticular, visible at a few points on upper Elk	0 to 1	265	15'
Shales, red or green, with numerous green, lenticular sandstones, usually flaggy or shaly, but sometimes massive	370 to 648	913	
Sandstone, Big Spruce Knob, green, flaggy	0 to 30	943	
Shale, Big Spruce Knob, gray, with plant fossils	0 to 2	945	
Coal, Big Spruce Knob, medium-soft, double-bedded (prospected on head of Williams River, Pocahontas County).	0 to 5	950	685'
Shale, red or green, with lenticular, green sandstones	0 to 310	1260	
Limestone, Hinton, shaly, with marine fossils	10 to 40	1300	
Shale, red or green, with lenticular sandstones	20 to 50	1350	
Sandstone, Webster Springs, greenish-gray, massive, or current-bedded.....	20 to 150	1500	
Greenbrier Limestone .....	...	....

DESCRIPTION OF MEMBERS OUTCROPPING IN NICHOLAS COUNTY.

As above stated, only about 450 feet of the upper portion of the series is visible above drainage at its best exposure on South Fork of Cherry River above Richwood, the lowest outcropping beds being approximately 200 feet below the horizon of the Pluto Coal. None of the borings of southern Nicholas record the Pluto and Big Spruce Knob Coals, and their existence in the county is therefore doubtful. The Terry and Hinton Limestones, and the Webster Springs Sandstone, however, have been doubtfully identified in the sections for Deepwell (Northwest), page 169, and Hominy Falls, page 176.

PRINCETON CONGLOMERATE.

The **Princeton Conglomerate** of Campbell², named from its occurrence at the town of Princeton, Mercer County, where it belongs 800 feet below the base of the Pottsville and 2500 feet above the Greenbrier Limestone, is above drainage in the extreme southeastern corner of Nicholas. In this region it is a huge, massive conglomerate, greenish-gray in color, 50 to 100 feet thick, and containing numerous large, angular, white quartz pebbles, one-half to one inch in diameter, so closely cemented together as to give the ledge almost the appearance of a quartzite, its position being 50 to 100 feet below the base of the Pottsville. On South Fork of Cherry River the stratum rises above drainage one-half mile south of the forks of Cherry and extends up South Fork to the Greenbrier County Line with an almost unbroken vertical cliff, its base at the line having an elevation of 2595' B., being 350 feet above drainage. On North Fork of Cherry it rises above drainage 3½ miles above Richwood, and so remains to the Greenbrier County Line where it has an elevation of 2830' B., being 200 feet above drainage, its outcrop making heavy cliffs throughout the greater portion of the two miles of its outcrop. On Little Laurel Creek, also, what is apparently the same cliff was noted one mile north of the Greenbrier Line, having an elevation of 2285' B., and being only a few feet above drainage.

At Hominy Falls it is recorded in a boring as being 140 feet thick, and coming 120 feet below the base of the Pottsville. At Deepwell and other points farther north it appears to have thinned away and become inconspicuous, and its massive, conglomeratic development therefore appears to be mainly confined to the southern edge of the county.

According to Hennen³, the Princeton Conglomerate may possibly correlate with the **Maxton Oil Sand** of northern West Virginia, and this supposition may be the correct one, although the evidence is far from conclusive, owing to the lack of a sufficient number of borings to trace it through to the oil fields.

²M. R. Campbell, Pocahontas Folio, No. 26, U. S. Geol. Survey; 1896.

³Ray V. Hennen, Wyoming and McDowell Report, W. Va. Geol. Survey, pp. 249-250; 1915.

TERRY LIMESTONE.

The **Terry Limestone** of Krebs⁴, named from its exposure at the town of Terry, Raleigh County, where it comes 346 feet below the base of the Pottsville and just under what appears to be the Princeton Conglomerate, was not observed above drainage in Nicholas, although its horizon outcrops both on North and South Forks of Cherry River, the great amount of debris from the conglomerate mainly obscuring it if present. In the adjoining county of Webster it is a persistent horizon with numerous marine fossils. As stated above it is doubtfully identified in the sections for Hominy Falls and Deepwell.

The **Pluto Shale** of the writer⁵, named from its occurrence on Leatherwood Creek, south of Bergoo, Webster County, where it is a dark, carbonaceous shale, containing marine fossils, and coming between the Princeton Conglomerate and Pluto Coal, was not observed in Nicholas. Its horizon outcrops, however, on both forks of Cherry River above Richwood, but appears to be obscured by talus from the conglomerate.

The **Pluto Coal** of Krebs⁶, first named in Raleigh County where it occurs not far below the apparent horizon of the Princeton Conglomerate, was not noted in Nicholas, either in the region where it should outcrop on the two forks of Cherry River or in borings which have been made through its horizon.

No other members of the Mauch Chunk Series, as classified in the general section on page 353, outcrop within the limits of Nicholas County.

⁴C. E. Krebs, Raleigh Report, W. Va. Geol. Survey, p. 69; 1916.

⁵D. B. Reger, Webster Report, W. Va. Geol. Survey, pp. 219-221; 1920.

⁶C. E. Krebs, Raleigh Report, W. Va. Geol. Survey, pp. 75 and 635; 1916.

PART III.

Mineral Resources.

CHAPTER IX.

PETROLEUM AND NATURAL GAS.

GENERAL STATEMENT.

Nicholas County is situated southeast of the main proved oil and gas belts of the State. The Burnsville gas field of Braxton County lies approximately 15 miles north of its most northern corner, the Rosedale Oil Pool of Braxton County lies 13 miles from its northwestern border, the Marne Oil Pool of Clay County is situated 7 miles north of its most western corner, and the Kelly Creek Oil Pool of Kanawha County is about 10 miles west of the same point. Southeast of the irregular arc connecting these various developments, oil and gas in large quantity have not been found, but toward the northwest their occurrence is known to be more or less general along the minor anticlines and synclines that are roughly parallel to the Appalachian Geosyncline that passes through the western edge of the State in a northeast-southwest direction. Southeast of this main producing region a few scattered shows of oil and occasional gas wells have been drilled but many of the tests have proved to be barren, thus lending weight to the pronounced opinion of many petroleum geologists and operators that oil and gas will not be found in large quantity in counties that, like Nicholas, lie far removed from the axis of the great Appalachian Basin, the belief being often expressed that these counties lie so near the region of violent orogenic disturbance, as evidenced

by the Alleghany Mountain uplifts, that whatever liquid or gaseous hydrocarbons their rocks may once have contained have mostly escaped in volatile form through cracks and fissures and along the upturned and exposed edges of the strata in the Greenbrier and other mountain valleys.

In Nicholas County, however, some encouraging productive gas wells have been drilled. Of the 22 deep tests that have been completed in the county 7 have been totally dry, one had sufficient oil to have made a producer, and 8 have been gas wells of sufficient volume to be classed as productive, and the other 6 had some slight shows of oil or gas, the productive holes being all located in a narrow belt along the northwestern and northern edge of the county. In this region there are good reversals of dip, as shown by Map II, and it is the belief of the writer that a considerable gas field and possibly some small oil pools may be developed in coming years. In the remainder of the county the structure is mainly monoclinal, interrupted by only slight terraces, and giving little clue to any possible productive region. The controlling factors are apparently structure and proximity to the Alleghanics, as all the tests drilled in the county have shown an abundance of good, porous sands, with the necessary impervious shale covering.

In the region south of Gauley River two deep tests and one shallow hole have been drilled, one of which made a slight show of oil, and another a small show of gas. In this portion of the county the structure contours on the Sewell Coal offer little positive evidence as to the presence or absence of favorable structure on the oil sands, as the northward convergence in the Pennsylvanian, Mauch Chunk, and Greenbrier Rocks is so great as to completely hide any slight reversals of dip that may exist in the lower formations.

The wells that have been drilled in the county range from a few hundred feet to more than 3800 feet in depth, all of the customary producing sands of the State having been penetrated by many of the deeper holes. No attempt has been made to reach the deep sands of Ohio which lie at a much lower level, being separated from the West Virginia and Pennsylvania sands by a shale interval of several thousand feet.

Drilling is done altogether by cable tools, the sandstones being too hard for the rotary method. Three strings of casing are generally used, 10-inch, 8¼-inch, and 6⅝-inch, the latter being set in the Big Lime. When water or caving shales are found below the Big Lime it is necessary to set an additional string of 5 3/16-inch at some lower level.

OIL AND GAS HORIZONS.

The following classification of the various oil and gas sands of the State, taken with slight revisions from former Reports of the Survey¹, gives not only the sands that have been productive or have made encouraging shows in Nicholas County but also the other productive horizons of other counties and some that have produced oil in northwestern Pennsylvania and that have made shows of gas or oil in some of the northern West Virginia counties, as well as the deeper horizons of Ohio and Kentucky that are now being sought for at great expense in the northern part of the State. Those which have produced oil or gas or have made shows of the same in Nicholas County are printed in a black-faced type:

Oil and Gas Horizons of West Virginia.

Pennsylvanian:

Monongahela Series.....	| Carroll Sand (Uniontown).
Conemaugh Series.....	{ Minshall Sand (Connellsville). Murphy Sand (Morgantown). Moundsville Sand (Saltsburg). First Cow Run (Little Dunkard) Sand (Buffalo). Big Dunkard Sand (Mahoning).
Allegheny Series.....	{ Burning Springs Sand (Upper Freeport). Gas Sand of Marion and Monongalia Counties (Lower Freeport).
Pottsville Series.....	{ Second Cow Run Sand of Ohio (Home-wood). Cairo Gas Sand. Cairo Salt Sand. Cairo? Rosedale Gas Sand (Guyandot?). Rosedale Salt Sand (Sharon Conglomerate).

¹See Monongalia, Marion and Taylor Report, p. 388; Lewis and Gilmer Report, p. 176; Barbour, Upshur and Western Portion of Randolph Report, p. 302; and Webster Report, pp. 233-234.

Mississippian:

- Mauch Chunk Red Shale Series..... { **Princeton Conglomerate.**
Maxton, Dawson, Cairo.
 Little Lime (Hinton).
- Greenbrier Limestone..... | **Big Lime.**
- Pocono Sandstone Series..... { **Keener Sand** and Beckett Sand of
 Milton.
Big Injun Sand.
Squaw Sand.
Weir Sand.
Berea Sand.

Devonian:

- Catskill Red Beds..... { Gantz Sand.
 Fifty-foot Sand.
 Thirty-foot Sand.
 Gordon Stray Sand.
 Gordon Sand.
 Fourth Sand.
 McDonald or Fifth Sand.
 Bayard or Sixth Sand.
 Elizabeth or Seventh Sand.
- Chemung and Portage Beds..... { **Warren First Sand.**
 Warren Second (Burnside?) Sand.
 Clarendon or Tiena Sand.
 Speechley Sand.
 Balltown or Cherry Grove Sand.
 Sheffield or Cooper (Reiley?) Sand.
 Benson, Bradford? or Deer Lick Sand.
 Elk or Waugh and Porter Sand.
 Kane Sand.
- Marcellus or Romney..... | Gas in Ohio and Kentucky.
- Corniferous (Columbus) Limestone... { Ragland, Menefee or Irvine Sand of
 Kentucky.

Silurian:

- Helderberg, Salina and Niagara..... { "Big Lime" of Ohio (Newburg Sand
 near middle).
- Medina White Sandstone..... | Clinton Sand of Ohio.

Ordovician:

- Martinsburg or Cincinnati Shale..... | Hudson Sand Group of Kentucky.
- Trenton and Other Limestones..... | Trenton Sand Group of northern Ohio.

In Nicholas County the sands of the Monongahela Series do not exist at all as they belong above the tops of the hills, and all the sands of the Conemaugh are absent except the Moundsville, First Cow Run (Little Dunkard), and Big Dunkard, which are found only in a few hilltops and ridges along the northern edge, and may be classified as not possibly productive. The sands of the Allegheny and upper portion of the Pottsville, also, are well up in the hills and are therefore not available as possible oil and gas horizons. The oil sand column of Nicholas may for that reason be considered as starting with the Rosedale Gas and Salt Sands and extending down possibly to the Ordovician Limestones which may be a potential source of oil and gas at some future date when

methods for extremely deep drilling shall have been perfected. In the territory north and northwest of Nicholas the principal producing sands are the lower two horizons of the Pottsville and the sands of the Pocono and Catskill Series. In Nicholas, however, the Catskill Series is represented almost entirely by shale beds, and it seems probable that production will be limited to the Pottsville and Pocono, with a considerable amount of gas in the Big Lime which sometimes contains it when sandy layers are present. There is little doubt that several of the deep sands of the Lower Devonian, Silurian, and Ordovician exist under the county but as most of them have not been pierced by the drill in any adjacent region where the primary requisites of only gently disturbed strata and impervious cover exist, little positive information is available on their possibilities for oil and gas.

In the following table the approximate intervals from four principal key rocks; viz, **Lower Kittanning (No. 5 Block) Coal, Eagle Coal, Sewell Coal,** and the top of the **Big Lime,** are given for several localities in the county, no sands being named in the list above the Rosedale Gas Sand, which, as explained above, is regarded as the highest possible producer. Regarding the accuracy of the table it can be stated that the intervals for the sands of the Pottsville, Mauch Chunk, Greenbrier, and Pocono Series may be regarded as approximately correct for the northern half of the county. In the region south of Gauley, however, where only a few holes have been drilled, they are more in the nature of an approximation based on general geologic information of adjacent regions. The intervals to sands in the Chemung and Portage Beds may be regarded as semi-approximate, since these groups have been drilled through in counties farther north and have been pierced in part by the deep boring at Deepwell. The intervals to the supposed sand horizons below the Chemung and Portage Beds are merely an estimate based on such general information as is available on these formations in the Appalachian region and this portion of the table will doubtless need revision when wells have been drilled through these sands. The sands of the Catskill Series, being apparently absent in Nicholas County, are not included in the table, except at Deepwell where some of them were doubtfully identified:

Table of Oil and Gas Sand Intervals, Nicholas County.

(Black-faced type indicates that the sand is above the key rock named at the top of the column, and the roman type indicates that it is below the key rock. Intervals at Tioga should be much the same as at Hookersville, and intervals at Richwood and Nallen should not differ much from those at Hominy Falls).

Top of Sand	Hookersville			Summersville			Swiss			Deepwell			Hominy Falls		
	Lower Kittanning Coal	Sewell Coal	Top of Big Lime	Eagle Coal	Sewell Coal	Top of Big Lime	Eagle Coal	Sewell Coal	Top of Big Lime	Sewell Coal	Top of Big Lime	Sewell Coal	Top of Big Lime		
Rosedale Gas	1100	100	850	650	100	1350	650	100	1025	100	1600	100	2050		
Sewell Coal	1200	750	750	0	1250	750	0	925	0	1500	0	1950			
Rosedale Salt	1210	10	740	800	50	1200	900	150	775	175	1325	175	1775		
Maxton	1825	625	125	1850	1100	150	1525	775	150	1175	325	1500	450		
Little Lime	1900	700	50	1950	1200	50	1625	875	50	1325	175	1650	300		
Big Lime	1950	750	0	2000	1250	0	1675	925	0	1500	0	1950	0		
Keener	2250	1050	300	2250	1500	250	1850	1100	175	1875	375	2350	400		
Big Injun	2400	1200	450	2400	1650	400	2025	1275	200	1875	375	2375	425		
Squaw	2475	1275	525	2475	1725	475	2125	1375	475	350	1975	475	2425		
Weir	2550	1350	600	2550	1800	550	2275	1525	600	2050	550	2475	525		
Berea										2200	700	2550	600		
Gantz															
Thirty-foot															
Gordon Stray															
Gordon															
Fourth															
Fifth															
Sixth															
Seventh															
Warren First	3500	2300	1550	3600	2850	1600	3400	2650	1725	2900	1400	3600	1650		
Warren Second (Burnside?)	3750	2550	1800	3850	3100	1850	3650	2900	1975	3250	1750	3950	2000		
Clarendon	3850	2650	1900	3950	3200	1950	3750	3000	2075	3600	2100	4050	2100		
Speckley	4200	3000	2250	4300	3650	2300	4100	3350	2425	4050	2550	4400	2450		
Balltown	4350	3150	2400	4450	3700	2450	4250	3500	2575	4200	2700	4550	2600		
Sheffield (Reiley?)	4550	3350	2600	4650	3900	2650	4350	3600	2675	4300	2800	4650	2700		
Benson (Bradford?)	4850	3650	2900	4950	4200	2950	4650	3900	2975	4600	3100	4950	3000		
Elk	5050	3850	3100	5150	4400	3150	4850	4100	3175	4800	3300	5150	3200		
Kane	5250	4050	3300	5350	4600	3350	5050	4300	3375	5000	3500	5350	3400		
Marcellus Group	6600	5400	4650	6700	5950	4700	5700	4950	4925	6000	4700	5550	3600		
Corniferous (Columbus) Lime	7000	5800	5050	7100	6350	5100	6000	5250	4325	6600	5100	5950	4000		
Oriskany	7050	5850	5100	7150	6400	5150	6050	5300	4375	6650	5150	6000	4050		
Ohio "Big Lime"	7150	5950	5200	7250	6500	5250	6150	5400	4475	6750	5250	6100	4150		
Clinton	8200	7000	6250	8300	7550	6300	7200	6450	5525	7800	6300	7150	5200		
Martinsburg Group	8700	7500	6750	8800	8050	6800	7700	6950	6025	8300	6800	7650	5700		
Trenton Group	9600	8400	7650	9700	8950	7700	8600	7850	6925	9200	7700	8550	6600		

DESCRIPTION OF SANDS.

The sands of the Monongahela, Conemaugh, and Allegheny Series have proved to be productive mainly in the western portion of the State where they dip to a low structural level, being covered by the Permo-Carboniferous deposits of the Dunkard Series. In Nicholas, as previously stated, they belong either above the tops of the ridges or lie well above the erosion levels of the streams and thus offer no hope of oil or gas, and their description is accordingly omitted from this Report.

Sands of the Pottsville Series.

As previously stated the sands of the upper portion of the Pottsville Series lie mainly above drainage in Nicholas and offer little, if any, hope of oil or gas production, and need not therefore be described.

Rosedale Gas Sand.—The Rosedale Gas Sand of the writer², named from its occurrence in the vicinity of Rosedale, Braxton County, where it is a well-defined gas producer, and probably correlating with either the Guyandot or Lower Guyandot Sandstone of the New River Group, should be present below drainage over a considerable area in the northern portions of Jefferson, Grant, Summersville, Hamilton, and Beaver Districts, its interval below the Lower Kittanning Coal being 1000 to 1100 feet. Its thickness varies from 40 to 60 feet and it is usually gray and coarse. No production from it has been recorded in the county.

Rosedale Salt Sand.—The Rosedale Salt Sand of the writer³, named from its occurrence along the Braxton-Gilmer County Line in the vicinity of Rosedale where it has produced a considerable amount of oil and some gas, and apparently correlating with the Upper Raleigh (Sharon) Sandstone of the New River Group, should be present below drainage over a considerable portion of the northern half of the county, its outcrop being confined to the southern half,

²D. B. Reger, Lewis and Gilmer Report, W. Va. Geol. Survey, p. 178; 1916.

³Ibid., p. 178.

including the deep gorge of Gauley River. At the northern end of the county its interval below the Lower Kittanning Coal is approximately 1200 feet and a few miles farther south it lies from 800 to 900 feet below the Eagle, its thickness varying from 50 to 100 feet and its character being that of a coarse-grained, gray sandstone. It has produced gas in considerable quantity in the **Rader wells (Nos. 20 and 21 on Map II)**, on Buck Garden Creek, and also showed gas in the **McQueen Well (No. 23 on Map II)** at Hookersville.

Sands of the Mauch Chunk Series.

Maxton Sand.—The Maxton Sand, occurring in the Mauch Chunk Series at a variable interval below the top of the Series but believed by Hennen⁴ to correlate with the Princeton Conglomerate, is a horizon that has produced a large amount of oil and gas in some of the western and northern counties of the State where it is usually noted as a close-grained greenish stratum, being somewhat lenticular in its occurrence. The writer is somewhat inclined to doubt the hypothesis that it correlates with the Princeton Conglomerate since the latter member seems to be a strictly southern development, following closely along the western fringe of the Alleghanies, and apparently disappearing as a regular stratum soon after it goes under drainage on the northwest dip, and differing much in primary physical characteristics from the Maxton Sand. A further important fact is that the Princeton Conglomerate belongs in the upper third of the series while the Maxton Sand, as usually correlated, belongs in the lower third, not far above the Big Lime. The Maxton Sand, as recorded in well records in Nicholas County, is a medium-grained stratum, 20 to 50 feet thick, coming 625 to 1500 feet below the Sewell Coal and 125 to 450 feet above the Big Lime, its position with reference to these two key rocks differing much on account of the rapid thickening of the Mauch Chunk Series from north to south. It made a creditable showing of oil in the **H. O. Havener No. 2 Well (No. 6 on Map II)**, located in

⁴Ray V. Hennen, Wyoming and McDowell Report, W. Va. Geol. Survey, pp. 249-250; 1915.

Jefferson District, as well as gas shows in one or two wells, and as its horizon lies far below drainage over the entire county it seems probable that further production may be expected.

Little Lime.—The Little Lime is a calcareous stratum that, according to many well records in the western portion of the State, comes only a few feet above the Greenbrier Limestone or "Big Lime", being separated from the same by a few feet of shale known as the "Pencil Cave". It seems likely that this member correlates with the Hinton Limestone, its thickness being from 10 to 100 feet, and its principal function being that of a marker for the Big Lime below it. So far as known it has made no show of oil or gas in the county, but made some gas in the **Davenport & Elliott No. 1 Well (No. 15 on Map II)**, located in the edge of Clay County. As shown by the Table of Oil and Gas Sand Intervals, page 361, its interval above the Big Lime increases rapidly south of Gauley River, the massive Webster Springs Sandstone intervening between the two members.

Sands of the Greenbrier Limestone Series.

Big Lime.—The Big Lime, or Greenbrier Limestone, belonging 2000 feet below the Eagle Coal in the vicinity of Summersville and 1950 feet below the Sewell at Hominy Falls, is a hard, gray, calcareous stratum, varying from 150 to 400 feet in thickness. In the southwestern part of the State it has produced a large amount of gas and some black oil in Logan, Mingo, Wayne and other counties. In Nicholas it belongs below drainage in all parts of the county and has made important showings of gas in several wells, which probably occur in sandy streaks since the general body of the lime is not known to be dolomitic. Some geologists have held that the oil and gas content of the Big Injun Sand has migrated downward from the Big Lime, and if that could be true its presence over the entire acreage of Nicholas County is a factor of prime importance. In addition to its value as an actual producer and as a possible genesis of oil and gas it forms a well-defined key rock at the top of the main oil sands that gives it a definite stratigraphic value in

the rock column. It is credited with a gas flow of $2\frac{1}{2}$ million cubic feet daily in the **Lewis Coal & Land Company No. 1 Well (No. 12 on Map II)**, located in Jefferson District.

Sands of the Pocono Series.

Keener Sand.—The Keener Sand, coming at the top of the Pocono, and directly underlying the Big Lime, is usually regarded as a split off the Big Injun Sand, being only 25 to 30 feet thick when distinguished from the latter sand. So far as known it occurs as a separate sand in Nicholas only in portions of the western and southern parts of the county, having made a show of gas in the **H. O. Havener No. 1 Well (No. 2 on Map II)**, located in Jefferson District.

Big Injun Sand.—The Big Injun Sand, usually coming directly under the Big Lime but sometimes being separated from it by the thin Keener Sand and often by a streak of red shale in the southern portion of the State, is probably the most valuable oil and gas sand in the State. It varies from 50 to 200 feet in thickness and is usually a coarse, pebbly stratum, with an ideal physical structure for holding oil and gas. In Nicholas County it has made showings of gas at several points, and will probably prove to be productive of oil and gas in some of the northern districts.

Squaw Sand.—The Squaw Sand, usually found about 150 to 200 feet below the top of the Big Injun, and belonging approximately 2400 feet below the Eagle Coal in the vicinity of Summersville, has an average thickness of 25 to 50 feet, its character being similar to that of the Big Injun, except that it is not usually so pebbly, its color being gray and its texture medium-coarse. It is not credited with any showings of oil or gas in Nicholas County but it made a show of gas in the **Davenport and Elliott No. 1 Well (No. 15 on Map II)**, located in Clay County, and it has been a prolific producer of oil and gas in Kanawha County.

Weir Sand.—The Weir Sand of Krebs⁵, named from its occurrence in the Blue Creek Oil Field of Kanawha County, where it is a prolific oil producer, being regarded by some

⁵C. E. Krebs, Kanawha Report, W. Va. Geol. Survey, pp. 302-303; 1914.

geologists as identical with the Squaw Sand, belongs 450 to 550 feet below the top of the Big Lime in Nicholas. It is usually not more than 25 to 50 feet in thickness and is sometimes entirely absent, its color when present being gray and its texture medium-coarse. It has not been credited with any production in the county, but made a show of oil in the **Henry McQueen No. 1 Well (No. 23 on Map II)**, located near Hookersville.

Berea Sand.—The Berea Sand, belonging at the base of the Pocono, and from 550 to 700 feet below the top of the Big Lime, is one of the most persistent and valuable of the oil and gas horizons of the State, its production in the Cabin Creek (Kanawha County), and other fields in recent years having given it an additional interest in counties which, like Nicholas, lie along much the same belt between the Appalachian Basin and the Alleghany Mountains. The sand varies from 10 to 40 feet in thickness and is usually marked by a stratum of brown, coffee-colored shale that comes just above it and aids in its identification. Its color is gray and its texture coarse and sometimes pebbly. In Nicholas County it seems to be largely absent but is recorded in some of the wells, there being no production credited to it.

Sands of the Catskill Red Beds.

The sands of the Catskill Series, in those portions of the State in which they occur, are distinguished generally by frequent beds of red shale between the various sandy members and by a brownish-red color of the sands themselves. Most of them are lenticular, often thinning out completely in a distance of a few hundred feet, but they have been prolific in oil and gas in the northwestern part of the State, being usually non-water-bearing so that the oil occurs mainly along the axes of the synclines. Of these sands, nine in number, nearly all have thinned out completely or have been replaced by shale in Nicholas County, so that they offer no probable source of much oil or gas. At Deepwell the **Gauley Coal Land Company No. 1 Well (No. 29 on Map II)** records two deep sands that have been doubtfully correlated with the Sixth and Seventh Sands, respectively, there being no oil or

gas. It is quite likely that in the southeastern portion of the county several of the Catskill sands would be revealed by drilling, as the same series contains several heavy sandstones at its outcrop along the Greenbrier River, several miles farther southeastward, but if present they would constitute only a doubtful source of oil, owing to their proximity to the surface outcrops mentioned.

Sands of the Chemung and Portage Beds.

Little definite knowledge is available regarding the sands of the Chemung and Portage beds in Nicholas. Well No. 29, mentioned above, penetrated these beds to a depth of 481 feet, the Warren First, Warren Second, and Clarendon, being doubtfully identified, of which the first mentioned made a show of oil, and the **Gauley Coal Land Company No. 1 Well (No. 31 on Map II)**, located on Hominy Creek, near Hominy Falls, was drilled approximately 300 feet into these beds but found no sands in them. Sufficient information is not available to describe in detail the various sands of these two groups but it would seem fairly certain that several of them exist in portions of the county and their succession and probable intervals below the Big Lime and other key rocks are given in the Table of Oil and Gas Sand Intervals, page 361. Owing to the almost complete lack of facts no reliable statement can be made as to their probable oil or gas.

Sands of the Lower Devonian.

The determined efforts of some of the larger operators in the State to test the deep sands of the Lower Devonian, Silurian and Ordovician Rocks make a discussion of their character and depth a pertinent matter even though the information concerning them is vague and uncertain. The goal of most of these efforts has been the Clinton Sand of Ohio but as yet it has not been penetrated in the defined oil and gas fields of the State, the two deepest wells in the world, drilled in Harrison and Marion Counties, having both failed to reach it by several hundred feet. That some of these deep sands which produce great quantities of oil and gas in Ohio,

Indiana, Kentucky, and New York probably exist in good development along the Appalachian Basin in West Virginia seems evident not only from the fact that they have produced oil and gas in the neighboring States named above but also from the additional knowledge that they outcrop in the Alleghany Mountains immediately southeast of the West Virginia fields. Should commercial production of gas be developed in these lower sands rock pressures would be enormous, making it possible to transport the gas for long distances without artificial compression.

Genesee, Hamilton, and Marcellus.—Beneath the Chemung and Portage beds come the Genesee and Hamilton Shales with a probable thickness of 1000 to 1500 feet, not known to contain productive horizons in any neighboring locality, but in the Marcellus Group, coming below the two formations named above, gas has been found in lenticular sands in Ohio and Kentucky. This group is probably 300 to 400 feet thick, the shales being dark-brown or black in color, highly carbonaceous, and containing nodular limestones, as observed by the writer in the Greenbrier Valley of Pocahontas County. The probable depth to the top of the group at various points in Nicholas is given in the Table of Oil and Gas Sand Intervals, page 361.

Corniferous Limestone.—The Corniferous Limestone, so named because of the flint or hornstone that it sometimes contains, and sometimes called the Columbus Limestone in adjoining States, is a dark, hard, calcareous stratum, often containing nodules of flint or siliceous matter, and varying in thickness from 10 to 50 feet, its position being immediately beneath the black Marcellus Shale. In the State of Kentucky this member of the Devonian has produced a large amount of oil and gas, being known in various regions of the Commonwealth as the "Ragland", "Menefee", or "Irvine" Sand. Owing to its great depth this stratum has been penetrated in West Virginia by only eight wells, of which records are available; viz, the Central City Well in Cabell County, the David Bartram No. 483 Well in Wayne County, the Slaughter Creek Coal and Lumber Company Well in Kanawha County, the Martha O. Goff No. 4190 Well in Harrison



PLATE XVI.—Upper Nuttall Sandstone at edge of plateau south of Gaultey River and 1.3 miles northwest of Mt. Nebo.
Photo by F. E. Harris.

County, the J. H. Lake No. 4304 Well in Marion County, the Parsons Pulp and Lumber Company Well in Tucker County, the Clara Hooper Well in Pendleton County, and the Volcanic Oil and Coal Company Well (No. 4670 of the Hope Company series) in Wood County. It has not proved to be productive except in the last-named well, where, according to Dr. I. C. White⁶, it is apparently the Corniferous Limestone that has produced some oil and gas, a much greater production of gas being obtained in the Oriskany Sand just below it.

In Pocahontas County, southeast of Nicholas, the writer has observed what appears to be the Corniferous Limestone in the region southeast of the Greenbrier River, where it is brought to the surface by steep mountain folds, being dark, hard, and flinty and holding some small species of marine fossils, no corals being in evidence. These exposures in a region not far from Nicholas would indicate its presence in that county, where if not actually impregnated with oil or gas, it would serve as a definite marker for the Oriskany, Clinton, and other sands below it. As recorded in the Table of Oil and Gas Sand Intervals, page 361, its interval below the top of the Big Lime at Summersville is estimated as 5100 feet. In the State of Kentucky production from this horizon seems to occur mainly in regions lying within a few miles of its outcrop, the theory being advanced by some petroleum geologists that its porous character in such localities is due to the leaching effect of circulating water rather than to dolomitization. Apparently the most hopeful locality in the county for tests in this or any other of the deep strata would be along the Mann Mountain Anticline in Jefferson District, as, in addition to the favorable structure, the Mauch Chunk, Greenbrier, Genesee, and Hamilton Groups would all be much thinner than in regions farther east.

Oriskany Sand.—The Oriskany Sand, coming just beneath the Corniferous Limestone, is a grayish-white, or yellowish-colored sandstone, 25 to 100 feet in thickness, and coarse in texture, being listed as a producer of oil and gas in southern Indiana, southern Ontario and central New York.

⁶I. C. White, Introduction to Barbour, Upshur and Western Portion of Randolph Report, W. Va. Geol. Survey, p. lii; 1918.

In West Virginia it has been penetrated by the wells named above for the Corniferous Limestone, with the exception of the Central City well and the Martha O. Goff, both of which stopped in the lime. In most of these wells it has been barren or impregnated with salt water but in the Volcanic Oil and Coal Company Well in Wood County it produced gas with a considerable volume at first but was subsequently drowned out by salt water from the same horizon. East and northeast of Nicholas County it has been noted at outcrop by the writer in Pocahontas and Pendleton Counties, and it seems fairly certain that it underlies a considerable portion of Nicholas. Owing to its water-bearing quality it would seem that production from it could be expected only in very high structural domes and as these do not exist in Nicholas it is doubtful whether it will ever prove to be a valuable oil or gas horizon in the county. Its depth below the top of the Big Lime at Swiss is estimated to be 4375 feet, or 6050 feet below the Eagle Coal which is approximately 100 feet above surface level where the Mann Mountain Anticline crosses the head of Otter Creek, making the estimated depth to the Oriskany at this point 5950 feet.

Sands of the Silurian.

The Silurian Rocks, having a probable thickness of 1200 to 1600 feet in Nicholas County, contain some massive limestones, several thick beds of shale, and a sandy member that has produced a large amount of oil and gas in adjacent States where it has been possible to reach it with the drill, besides other sands that have not been so prolific in hydrocarbons.

Helderberg, Salina, and Niagara Limestones.—The Helderberg Limestone, coming partly in the Devonian and partly in the top of the Silurian, and usually consisting of massive, white or gray limestone beds interstratified with thin shale breaks, followed by the Salina Beds immediately below it, the same being an interstratification of lime, shale, and rock salt, followed at the base by the Niagara Limestone, similar in character to the Helderberg, comprise what is collectively termed in the southeastern Ohio oil fields the "Big Lime". This group, which should not be confused with

the Big Lime of West Virginia, lying several thousand feet above it, has produced oil and gas in Ohio, New York, and Ontario. In West Virginia it has been penetrated in the Bartram well in Wayne County, the Slaughter Creek Coal and Lumber Company well in Kanawha, the Lake well in Marion, and the Hooper well in Pendleton, in none of which it showed oil or gas, but copious flows of salt water were encountered in the Slaughter Creek well. As an oil and gas reservoir in West Virginia it should not be regarded as hopeful. The Newburg Sand of the Cleveland, Ohio, region belongs near the center of this "Big Lime" Series, but so far as known it has not been identified in West Virginia. Estimated depths from the various key rocks to the top of this group are given in the Table of Oil and Gas Sand Intervals, page 361.

Clinton Sand.—The Clinton Sand of Ohio, generally conceded to be the Medina White Sandstone, coming at the top of the Medina Group of shales and sandstones, is an arenaceous stratum varying from 25 to 100 feet in thickness. In southeastern Ohio where it has produced a large amount of oil and gas it comes only 100 to 160 feet below the Ohio Big Lime, but in central West Virginia the Clinton Shales are probably thicker than in the Ohio Clinton oil and gas fields, as there is known to be a general thickening of the Devonian and Silurian shales toward the Alleghany Mountains, the thickness of the Clinton Shales, as observed by the writer at outcrop near the Hooper well in Pendleton County, having an estimated total of 800 to 1000 feet. In West Virginia the Clinton Sand has not been penetrated by the drill and its value as an oil and gas horizon is therefore still a matter of conjecture, but its abundantly petroliferous character in neighboring States makes it a possible source of oil and gas. In Pendleton and Grant Counties, where the writer has observed it at outcrop, it is a very hard, white, somewhat quartzitic sandstone, 50 feet in thickness, and it would seem probable that deep drilling would find it in the central portion of the State, between its mountain outcrop and the Ohio fields. Its estimated depth below the various key rocks in Nicholas County is given in the Table of Oil and Gas Sand Intervals, page 361.

Sands of the Ordovician.

Certain horizons of the Ordovician Period have produced oil and gas in neighboring States and the catalog of possible deep sands is not complete without reference to them.

Martinsburg or Cincinnati Shale.—The Martinsburg or Cincinnati Group, coming at the top of the Ordovician and at a supposed interval of about 500 feet below the top of the Clinton Sand, and composed mainly of gray shales with sandstone lentils, has produced a considerable amount of gas in central Kentucky, the production being in the several lenticular sands. The thickness of the group in Nicholas is probably 500 feet or possibly more, its depth below the various key rocks being estimated in the Table of Oil and Gas Sand Intervals, page 361.

Trenton Limestone Group.—The Trenton Limestone Group, composed mainly of the Trenton and other massive limestones, and having an estimated thickness of 1200 feet or more in central West Virginia, is the productive group in north central Ohio where it has been especially prolific in gas. Certain members of the same group have also produced oil and gas in Indiana, Kentucky, and New York, and it therefore seems probable that the pay formation might extend under central West Virginia, the presence of these limestones in good development in the Alleghany Mountain region, east of the Appalachian Basin, tending to confirm their presence under the Basin itself. This group is separated from the Martinsburg or Cincinnati Shale by the Utica Shales, black in color and containing sandstone lentils, their thickness being estimated at 300 feet or more. The depth of the Trenton Group below the various key rocks of Nicholas is given in the Table of Oil and Gas Sand Intervals, page 361.

WELL RECORDS AND PROSPECTIVE AREAS.

EARLY HISTORY.

The first attempt at drilling for mineral matter in Nicholas

was the **J. N. Dodrill Sulphur Well (No. 25 on Map II)**, located on Birch River at the mouth of Anthony Creek. According to Mr. Dodrill this well was drilled by Addison McLaughlin about the year 1845, the antiquated spring-pole method being employed. Salt sulphur water was found in copious quantity at an unknown depth and still flows from the hole at a rate of several barrels per hour, the product having been utilized at an early date for the manufacture of salt. Accompanying the water is a small amount of inflammable gas, of unknown chemical quality, the volume of which, if confined, would probably be enough to supply the domestic needs of one family. A deep test, drilled many years later near the original well, failed to find any larger flow of gas.

No further drilling was done in the county for probably more than half a century but in comparatively recent years several wells have been drilled, all of which will be mentioned in detail on subsequent pages.

SUMMARIZED WELL RECORDS.

The following table, compiled from the detailed records in Nicholas and territory immediately adjoining, is intended to exhibit at a glance the most important data regarding these wells, giving not only the serial numbers by which their positions are fixed on Map II, but also the tidal elevations, depth to Sewell Coal when available, depth and thickness of principal sands, total depth, and the record of producing sands. The detailed records of such as are available are published on subsequent pages of this Chapter and the index should be consulted to find the record of any particular well desired. The detailed records of two or three wells could not be secured and for these the table gives all available information. Throughout the text all wells when mentioned are accompanied by the serial numbers in parentheses, so that their positions on Map II may be readily found. In the elevation column the letter "B" indicates an elevation secured by aneroid barometer checked on near-by spirit-levels, and the letter "L" indicates a hand-level determination from a neighboring bench mark. All depths are expressed in feet. The

Summarized Record of Tests for

No. on Map II	Name of Property	Magisterial District	Company	Elevation above Tide. Feet.	Sewell Coal Top
1	Hill-Long No. 2.....	Jefferson.....	Dunbar O. & G.....	840B	.....
2	H. O. Havener No. 1.....	Jefferson.....	H. O. Havener.....	790B	.....
3	Newman No. 1.....	Falls (Fayette).....	C. O. G.....	746L	.....
4	Kanawha-Gauley C. & C. Co. No. 1.....	Falls (Fayette).....	Ohio Fuel.....	975B	.....
5	Kanawha & Hocking C. & C. Co. No. 1.....	Falls (Fayette).....	Cabot.....	670B	.....
6	H. O. Havener No. 2.....	Jefferson.....	H. O. Havener.....	715B	.....
7	Hill-Long No. 1.....	Jefferson.....	Dunbar O. & G.....	812L	.....
8	Lackawanna C. & L. Co. No. 106.....	Jefferson.....	Lackawanna.....	715B	.....
9	N. D. Backus No. 105.....	Jefferson.....	Lackawanna.....	780B	.....
10	Lackawanna C. & L. Co. No. 104.....	Jefferson.....	Lackawanna.....	1070B	1270
11	Lackawanna C. & L. Co. No. 103.....	Jefferson.....	Lackawanna.....	925B	.....
12	Lewis Coal & Land Co. No. 1.....	Jefferson.....	Lewis C. L.....	1010B	(881)
13	Lackawanna C. & L. Co. No. 102.....	Jefferson.....	Lackawanna.....	1115B	.....
14	E. V. Shelton No. 101.....	Jefferson.....	Lackawanna.....	1050B	.....
15	Davenport & Elliott No. 1.....	Henry (Clay).....	Elkland.....	1210B	.....
16	Elk River C. & L. Co. No. 1865.....	Henry (Clay).....	Hope.....	1015B	.....
17	Elk River C. & L. Co. No. 1341.....	Buffalo (Clay).....	Hope.....	1150B	.....
18	Elk River C. & L. Co. No. 1340.....	Summersville.....	Hope.....	1385B	.....
19	Elk River C. & L. Co. No. 1577.....	Summersville.....	Hope.....	1580B	.....
20	Allen Rader No. 1.....	Summersville.....	Enon O. & G.....	1500B	.....
21	Allen Rader No. 2.....	Summersville.....	Enon O. & G.....	1535B	.....
22	Joseph Sebert No. 1.....	Summersville.....	Chidester.....	1530B	500
23	Henry McQueen No. 1.....	Hamilton.....	Nicholas O. & G.....	1865L	800
24	Elk River C. & L. Co. No. 1553.....	Hamilton.....	Hope.....	1390B	.....
25	J. N. Dodrill Sulphur Well.....	Hamilton.....	McLaughlin.....	1130L	.....
26	J. N. Dodrill No. 1.....	Hamilton.....	Nicholas O. & G.....	1130L	.....
27	Floyd Morton No. 1.....	Glade (Webster).....	Dennison.....	2070B	530
28	J. N. Camden No. 1.....	Glade (Webster).....	T. N. Camden.....	2020L	458
29	Gauley C. L. Co. No. 1.....	Kentucky.....	Wick O. & G.....	1807L	105
30	Gauley C. L. Co. No. 2.....	Wilderness.....	Wick-Laing O. & G.....	2410B	150
31	Gauley C. L. Co. (G. O'Dell) No. 1.....	Wilderness.....	Wick-Laing O. & G.....	2380B	.....

following abbreviations of company names have been used in the table:

Chidester.....	L. B. Chidester and Others.
C. O. G.....	C. O. G. Company.
Dennison.....	Richard V. Dennison and Others.
Dunbar O. & G.....	Dunbar Oil and Gas Company.
Elkland.....	Elkland Oil and Gas Company.
Enon O. & G.....	Enon Oil and Gas Company.
Hope.....	Hope Natural Gas Company.
Lackawanna.....	Lackawanna Coal and Lumber Company.
Lewis C. L.....	Lewis Coal and Land Company.
McLaughlin.....	Addison McLaughlin.
Nicholas O. & G.....	Nicholas Oil and Gas Company.
Ohio Fuel.....	Ohio Fuel Oil Company.
Wick-Laing O. & G.....	Wick-Laing Oil and Gas Company.
Wick O. & G.....	Wick Oil and Gas Company.

Under the producing sand column all shows of oil and gas are noted, the following abbreviations being used for such sands as are not printed in full:

Rd. Salt.....	Rosedale Salt Sand.
Pt.....	Princeton Conglomerate.
Max.....	Maxton Sand.
L. Lm.....	Little Lime.
B. Lm.....	Big Lime.
Knr.....	Keener Sand.
B. I.....	Big Injun Sand.
Warren.....	Warren First Sand.

In addition to the abbreviated records of the table, such detailed logs and information as are available will be given in the following pages, except such records as have been incorporated in the measured sections of Chapter IV and are therein available. Reference to these wells will be made in their proper serial sequence. These records show, as far as could be obtained, all sands and formations encountered, as well as coal seams, water horizons, casing records, and oil or gas production and shows of the same, a few of the tests not having been obtained. In all cases an attempt has been made to give the proper correlation of the various sands and coals, the comparative information at hand being much more complete than could be had by the drillers.

DETAILED WELL RECORDS AND PROSPECTIVE AREAS, JEFFERSON DISTRICT.

Jefferson District lies at the extreme western end of the county, next to Clay, Kanawha, and Fayette Counties, the former two of which have produced a large amount of oil and gas. Its rock structure exhibits the Mann Mountain Anticline which, with a northward-plunging axis, extends across it from south to north, and the shallow Lockwood Syncline, parallel to the former fold. Nine wells have been drilled in the district, of which three are producing gas, one made a creditable show of oil, five made fair shows of gas, and two are reported totally dry.

The **Hill-Long No. 2 (1) Well**, drilled by the Dunbar Oil and Gas Company on Open Fork of Bells Creek at Bentre, on land that is now owned by the Coalbell Coal Company, was abandoned as a dry hole, a small show of gas having been reported at an unknown depth. The well starts at the level of the Cedar Grove Coal, its supposed depth having been 2000 feet, the detailed record not having been secured.

H. O. Havener No. 1 Well Record (2).

Jefferson District, on Lick Branch of Open Fork of Bells Creek, 0.4 mile northeast of Dixie; authority, H. O. Havener; completed, Janu-

ary 23, 1913; elevation, 790' B. Hole starts 10 feet above level of Peerless Coal.

	Thickness. Feet.	Total. Feet.
Soil	15	15
Sand, (water at 65')	65	80
Slate	10	90
Sand	20	110
Slate	50	160
Sand and lime shells	30	190
Slate	110	300
Sand, very hard, white	35	335
Slate and lime shells	120	455
Slate	33	488
Lime, very hard, gray	67	555
Lime, rotten, black	12	567
Lime, hard, gray	48	615
Sand, hard, gray	30	645
Slate and lime shells	35	680
Sand, hard, gray, (3 bailers of water) 20' } Slate 5 } Salt ... 70	70	750
Sand, white.....45 } Shale, black, Castle Coal horizon? 5	75	755
Sand, white, (a little water).....70' } Rosedale Sand, gray.....55 } Gas ...125	880	
Slate and lime shells	25	905
Lime, hard, gray	25	930
Sand, white, Rosedale Salt	120	1050
Slate and lime shells	65	1115
Sand	5	1120
Lime, black	30	1150
Sand, gray	40	1190
Slate and lime shells	10	1200
Red rock	25	1225
Slate and shells	20	1245
Lime, gray	50	1295
Red rock	47	1342
Slate and lime shells	43	1385
Red rock	35	1420
Slate	10	1430
Sand, Maxton, top hard, balance good.....	30	1460
Lime	131	1591
Pencil Cave	6	1597
Big Lime, regular	151	1748
Red rock, hard	8	1756
Sand, Keener, good, (show of gas, ¼ million feet)	2	1758
Lime shells	12	1770
Sand, white, hard .....16' } Sand, red, coarse (trace of oil at 1807'; show of gas, ¼ } Big Injun .. 41 million feet) .....25 }	1811	
Slate and lime shells.....	389	2200
Shells, hard	13	2213
Shale, brown	6	2219
Sand, Berea, white, hard.....	6	2225
Slate, to bottom.....	10	2235
10" casing, 20'; 8¼" casing, 480'; 6½" casing, 1620'.		

The **Newman No. 1 Well (3)**, located in Falls District, Fayette County, on the west side of Gauley River, 0.6 mile southwest of Belva, made gas in the Keener and Big Injun Sands, its total volume being $1\frac{1}{2}$ million feet daily, according to George A. Cunningham, Chief Engineer of the United Fuel Gas Company, of Charleston. The record of this hole has been published in connection with the Belva Section, pages 113-14.

The following record previously published by the Survey⁷ is that of a deep hole, drilled in Fayette County, 4 miles southwest of Belva, the same being totally dry and revealing a complete absence of sands for an interval of 968 feet below the Big Injun:

**Kanawha-Gauley Coal & Coke Company
No. 1 Well Record (4).**

Falls District, Fayette County, on Fourmile Fork of Smithers Creek, 0.5 mile southeast of Marting; authority, Ohio Fuel Oil Company; completed, December 16, 1916; elevation, 975' B. Hole starts at level of No. 2 Gas Coal.

	Thickness.	Total.
	Feet.	Feet.
Sand	40	40
Slate	15	55
Sand	17	72
Slate	28	100
Sand	55	155
Slate	5	160
Coal, Eagle	4	164
Slate	8	172
Sand	18	190
Slate	85	275
Lime	20	295
Slate and shells	80	375
Sand	50	425
Slate	65	490
Lime	35	525
Sand	35	560
Lime	25	585
Sand	75	660
Slate and shells	30	690
Sand	50	740
Slate and shells	78	818
Sand	57	875
Slate	15	890
Sand	75	965

⁷Ray V. Hennen, Fayette Report, W. Va. Geol. Survey, pp. 123-124; 1919.

	Thickness. Total.	
	Feet.	Feet.
Slate and shells.....	100	1065
Lime	30	1095
Sand	70	1165
Slate and shells.....	70	1235
Red rock.....	180	1415
Slate	30	1445
Red rock.....	33	1478
Shale and shells.....	162	1640
Sand, Maxton	62	1702
Little Lime.....	33	1735
Slate, cave.....	10	1745
Slate and shells.....	64	1809
Big Lime.....	225	2034
Sand, dark..... 4' } Big Injun.....	59	2093
Sand 55 }		
Slate and shells to bottom of hole.....	958	3051

"Dry in all sands and abandoned."

Casing record: 10", 210'; 8¼", 1256'; 6⅝", 1678'; 5⅜", 1819'.

The following record, previously published by the Survey⁸, is that of a Big Injun Sand gasser, located 5¾ miles southwestward from Belva, the same having been furnished the Survey by C. E. Krebs, of Charleston, with the accompanying statement that when the well was drilled it showed 2,000,000 feet of gas in the Big Injun but after being shot soon diminished to 50,000 feet:

Kanawha and Hocking Coal & Coke Company No. 1 Well Record (5).

Falls District, Fayette County, on the west side of Great Kanawha River at Glen Ferris; drilled by G. L. Cabot; began drilling May 14; completed, September 1, 1918; elevation, 670' B.; location on map furnished by C. E. Krebs.

	Thickness. Total.	
	Feet.	Feet.
Gravel	23	23
Sand	87	110
Slate and sand.....	75	185
Lime?	20	205
Slate and sand.....	90	295
Sand	100	395
Slate	55	450
Sand	200	650
Slate	150	800
Lime shells.....	50	850
Sand	75	925

⁸Ibid., pp. 347-348.

	Thickness. Total.	
	Feet.	Feet.
Red rock.....	50	975
Lime	15	990
Red rock.....	10	1000
Slate	15	1015
Lime	35	1050
Slate, white.....	40	1090
Lime	10	1100
Red rock.....	30	1130
Slate	15	1145
Red rock.....	20	1165
Lime	30	1195
Slate	5	1200
Sand, Maxton.....	55	1255
Slate	3	1258
Little Lime.....	37	1295
Break, unrecorded.....	3	1298
Lime	70	1368
Pencil Cave.....	2	1370
Lime, dark	30	} Big Lime.. 247 1617
Lime, white, (gas at 1499'; water at 1555').....	217	
Sand	73	} Big Injun.... 93 1710
Sand (gas at 1700').....	20	
Slate and shells.....	330	2040
Shale	25	2065
Shale and shells to bottom.....	173	2238
"Well shot and tubed for casing at 1700'; casing record: 13", 23'; 10", 63'; 8¼", 1308'; 6½", 1419'."		

H. O. Havener No. 2 Well Record (6).

Jefferson District, on the south side of Twentymile Creek; authority, H. O. Havener; completed, June 6, 1913; elevation, 715' B.; hole starts 85 feet below Eagle Coal.

	Thickness. Total.	
	Feet.	Feet.
Slate	40	40
Sand	80	120
Slate	40	160
Sand	30	190
Slate	30	220
Sand	20	240
Slate	230	470
Sand	48	518
Sand, Rosedale Gas.....	42	560
Lime, (water, 700').....	155	715
Sand, Rosedale Salt.....	190	905
Slate and shale.....	45	950
Hard limy shale.....	30	980
Slate	35	1015
Sand	60	1075
Slate and lime.....	10	1085
Red rock.....	25	1110
Slate and lime.....	91	1201

	Thickness.	Total.
	Feet.	Feet.
Red rock.....	44	1245
Lime.....	35	1280
Red rock.....	32	1312
Sand	33	1345
Slate	16	1361
Sand, Maxton (oil)	10	1371
Little Lime to bottom	6	1377

"Casing record: 10", 160'; 8¼", 480'; 6⅝", 1130'.

"When drilling in well it flowed 30 barrels in 20 minutes and then stopped. Later cave came in below casing and closed in well."

Hill-Long No. 1 Well Record (7).

Jefferson District, on hill south of Twentymile Creek and 0.8 mile northeast of Belva; authority, Dunbar Oil & Gas Company; completed in June, 1915; elevation, 812' L.; hole starts about 35 feet below Eagle Coal.

	Thickness.	Total.
	Feet.	Feet.
Loose dirt	15	15
Sand	30	45
Slate	30	75
Sand	35	110
Slate, hard	120	230
Sand	10	240
Slate	10	250
Lime	45	295
Conglomerate, Dotson	15	310
Slate	5	315
Sand, loose, Lower Dotson	85	400
Slate	5	405
Coal, Lower Douglas	3	408
Sand, Upper Nuttall	92	500
Lime, sandy	42	542
Coal, show, "Hughes Ferry," laeger	2	544
Lime, sandy	46	590
Slate	45	635
Sand, hard, Rosedale Gas	190	825
Slate	25	850
Sandy lime, hard	65	915
Sand and lime, extra hard, Rosedale Salt.....	225	1140
Slate cave	12	1152
Sand and shells	43	1195
Red rock	25	1220
Slate and shells	90	1310
Red rock	45	1355
Slate and shells	35	1390
Red rock	30	1420
Lime	35	1455
Lime, sandy, last 15', Maxton	45	1500
Slate and lime shells	30	1530
Lime	30	1560
Slate	20	1580
Slate cave	15	1595

	Thickness.	Total.
	Feet.	Feet.
Big Lime (gas at bottom).....	147	1742
Big Injun Sand	95	1837
Slate and shells	339	2176
Sand, Berea, broken	35	2211
Slate and shells to bottom	64	2275
"The gas in bottom of lime; Casing record: Conductor, 11'; 10", 350'; 8", 1152'; 6 $\frac{1}{2}$ ", 1615'."		

Lackawanna Coal & Lumber Company

No. 106 Well Record (8).

Jefferson District, on north side of Twentymile Creek, 1.1 miles northeast of Belva; authority, Lackawanna Coal & Lumber Company, through Geo. A. Cunningham, Chief Engineer, United Fuel Gas Company; elevation 715' B.; hole starts about 85 feet below Eagle Coal.

	Thickness.	Total.
	Feet.	Feet.
Unrecorded (little gas at 1120' and 1318')	1447	1447
Big Lime (little gas at 1495').....	202	1649
Red rock	2	1651
Slate	2	1653
Sand, Big Injun	29	1682
Slate	15	1697
Red rock	18	1715
Lime	14	1729
Slate	121	1850
Slate and shells to bottom.....	405	2255

N. D. Backus No. 105 Well Record (9).

Jefferson District, on Twentymile Creek at the mouth of Big Hollow, 0.9 mile south of Vaughan; authority, Lackawanna Coal & Lumber Company, through Geo. A. Cunningham, Chief Engineer, United Fuel Gas Company; elevation, 780' B.; hole starts 5 feet below Eagle Coal.

	Thickness.	Total.
	Feet.	Feet.
Unrecorded	1535	1535
Big Lime	185	1720
Sand, Keener	25	1745
Sand, Big Injun.....	10	1755
Lime and shells	55	1810
Sand, Squaw	10	1820
Lime shells	458	2278

According to Mr. Backus the above well was completed in 1913 and was plugged and abandoned, but the gas pressure, partly from a shallow sand and partly from the Big Injun, forces its way through the plug in sufficient volume to supply his residence with fuel.

**Lackawanna Coal & Lumber Company
No. 1 Well Record (10).**

Nicholas County, on Rockcamp Fork of Twentymile Creek, 1 mile northeast of Greendale, and 0.3 mile southeast of Clay-Nicholas Line; authority, Lackawanna Coal & Lumber Co.; completed, August 3, 1914; elevation, 1070' B.

	Thickness.	Total.
	Feet.	Feet.
Quicksand, surface	10	10
Sand, gray	20	30
Slate, black	50	80
Sand, white	7	87
Coal, Williamson?.....	3	90
Slate, black.....	10	100
Lime, gritty.....	36	136
Coal, Cedar Grove.....	2	138
Slate, black	52	190
Sand	10	200
Lime	30	230
Slate	40	270
Sand	23	293
Slate and shells.....	39	332
Lime	38	370
Slate	10	380
Sand	52	432
Slate	8	440
Shells	34	474
Coal, Little Eagle	6	480
Lime	36	516
Slate, black, Eagle?.....	20	536
Sand, white, Lower War Eagle and Upper Gilbert	54	590
Lime	10	600
Slate and shells.....	12	612
Lime and sand.....	23	635
Slate and shells.....	65	700
Lime	160	860
Sand, Nuttall, (5 bailers of water per hour at 980').....	130	990
Slate	24	1014
Lime	18	1032
Slate	30	1062
Sand, Rosedale Gas.....	208	1270
Coal, Sewell?.....	2	1272
Lime	36	1308
Slate	42	1350
Lime	31	1381
Slate cave.....	74	1455
Lime	10	1465
Slate and shells.....	35	1500
Lime	20	1520
Sand	30	1550
Red rock.....	80	1630
Lime	38	1668
Red rock.....	17	1685

	Thickness.	Total.
	Feet.	Feet.
Slate, white.....	5	1690
Lime, red.....	65	1755
Slate, white.....	35	1790
Lime, black, Maxton.....	70	1860
Slate, black, Pencil.....	27	1887
Big Lime (gas, 1937' and 2050').....	210	2097
Red rock.	10	2107
Slate and shale.....	69	2176
Slate, white.....	11	2187
Slate and shells.....	113	2300
Sand, blue.....	4	2304
Slate and shells.....	186	2490
Slate, coffee-colored.....	8	2498
Slate and shells.....	317	2815
Slate, light.....	25	2840
Lime	20	2860
Slate	10	2870
Lime	40	2910
Slate	10	2920
Lime	4	2924
Slate	31	2955
Lime	10	2965
Slate and shells.....	45	3010
Slate	130	3140
Shells	55	3195
Lime	15	3210
Slate and shells.....	60	3270
Lime	40	3310
Slate and lime.....	110	3420
Shale, brown.....	45	3465
Slate and shells.....	115	3580
Lime	35	3615
Slate and shells.....	100	3715
Lime	20	3735
Slate, soft.....	10	3745
Lime, hard.....	15	3760
Slate and shells.....	35	3795
Lime, hard.....	25	3820
Slate, soft.....	10	3830
Lime, dark.....	40	3870
Slate	10	3880
Slate and shells to bottom.....	99½	3979½
"Conductor, 20'; casing record: 10", 143"; 8", 1292'; 6½", 1897'."		

This record was previously published by the Survey in the Braxton and Clay Report, pages 376-377, by Ray V. Hennen, who makes the following remarks:

"The above well starts about 15 feet below an opening in the Winifrede Coal and about 465 feet below the Upper Kittanning bed. The well was shut in when visited by the writer during October, 1915, being a light gasser from the Big Lime. The log gives its volume at 50,000 cubic feet daily."

The **Lackawanna Coal and Lumber Company No. 103 Well (11)**, drilled on Lilly Branch of Twentymile Creek, one mile southeast of Vaughan, was reported as a dry hole, its record not having been obtained. The hole starts at the base of the Monitor Sandstone.

Lewis Coal and Land Company No. 1 Well Record (12).

Jefferson District, on Twentymile Creek near mouth of Peach Orchard Branch, 6 miles northeast of Vaughan; authority, Lewis Coal and Land Company, through Clark & Krebs, of Charleston, W. Va.; completed in 1917; elevation, 1010' B. Hole starts 45 feet below Peerless Coal.

	Thickness. Total.	
	Feet.	Feet.
Gravel and sand	30	30
Slate and shells	40	70
Coal, Eagle	3	73
Lime and shells (little fresh water, 90')	22	95
Slate, black	20	115
Slate, gray	15	130
Slate, shelly	25	155
Sand, gray	40	195
Slate, brown, Eagle Shale	65	260
Sand, white, Lower Gilbert	45	305
Slate, gray	40	345
Sand, white, Dotson	75	420
Coal, Douglas	6	426
Slate, dark	34	460
Lime	6	466
Slate	6	472
Sand, hard, white, Upper Nuttall (little salt water, 475')	93	565
Slate, brown	45	610
Sand, gray, Lower Nuttall	25	635
Slate	5	640
Lime	5	645
Slate, brown	15	660
Lime	22	682
Coal, Hughes Ferry	5	687
Slate, black	6	693
Lime	18	711
Slate, shelly	15	726
Slate, white	4	730
Lime	20	750
Slate, brown	20	770
Lime	10	780
Slate, brown	63	843
Sand, soft, Lower Guyandot, Rosedale Gas... ..	38	881
Slate, black, Sewell Coal horizon	6	887
Sand, hard, (little salt water, 895')	10	897
Slate	18	915
Lime	15	930

	Thickness. Total.	
	Feet.	Feet.
Sand, hard	10	940
Slate, gray	12	952
Lime, broken	50	1002
Slate, brown	58	1060
Lime	5	1065
Slate	35	1100
Sand, hard, Rosedale Salt, (little salt water, 1155')	60	1160
Lime, broken	25	1185
Red rock	110	1295
Lime, broken	5	1300
Lime, hard	15	1315
Sand, hard, Princeton (little salt water, 1330')	50	1365
Red rock	25	1390
Slate, gray	35	1425
Lime, black	35	1460
Sand, white, Maxton	10	1470
Lime, gray	10	1480
Slate, black	50	1530
Slate, gray	10	1540
Lime, black	15	1555
Big Lime (gas, 1670-1675'; 2,500,000')	190	1745
Red rock	35	1780
Slate, brown	45	1825
Lime, sandy	6	1831
Slate, gray	239	2070
Slate, brown	45	2115
Shell, hard	3	2118
Slate, shelly	12	2130
Slate, gray	88	2218
Lime	6	2224
Slate, gray	284	2508
"Casing record: 13", 35'; 10", 310'; 8¼", 1300'; 6⅞", 1560'."		

The above well, which is located just east of the axis of the Mann Mountain Anticline and is a good gasser in the Big Lime, reveals a total absence of sands for 763 feet below that member.

**Lackawanna Coal & Lumber Company
No. 102 Well Record (13).**

Jefferson District, on Little Elk Creek, 2.5 miles northeast of Swiss; authority, Lackawanna Coal & Lumber Company, through Geo. A. Cunningham, Chief Engineer, United Fuel Gas Company; elevation, 1115' B.; hole starts 60 feet below Eagle Coal.

	Thickness. Total.	
	Feet.	Feet.
Sand and gravel.....	16	16
Sand	12	28
Slate	32	60
Sand, Gilbert and Dotson	198	258

	Thickness.	Total.
	Feet.	Feet.
Sand and lime	622	880
Slate	35	915
Lime	15	930
Slate	65	995
Sand, Rosedale Salt	259	1254
Red rock	121	1375
Slate	31	1406
Red rock	30	1436
Sand and lime	188	1624
Big Lime (gas, 1745' and 1770')	176	1800
Sand, Big Injun (gas, 1830')	80	1880
Sand and lime	120	2000
Slate and shells	769	2769
Total gas, 750,000 cubic feet.		

The above well supplies the towns of Swiss and Jodie with domestic fuel, its structural position being slightly more than one mile west of the Mann Mountain Anticline.

E. V. Shelton No. 101 Well Record (14).

Jefferson District, on Otter Creek, just west of Lockwood; authority, Lackawanna Coal & Lumber Company, through Geo. A. Cunningham, Chief Engineer, United Fuel Gas Company; elevation, 1050' B.; hole starts on outcrop of Gilbert Shale.

	Thickness.	Total.
	Feet.	Feet.
Unrecorded	1500	1500
Lime, white, Big Lime (small pocket of gas, 1535')	140	1640
Sand, Keener	10	1650
Lime, sandy	20	1670
Slate	14	1684
Sand, red, Big Injun	10	1694
Slate and shells	66	1760
Slate	312	2072
Shale, black	10	2082
Sand, Berea	6	2088
White slate	42	2130

The above well made only a slight show of gas in the Big Lime and was abandoned as a dry hole, but the showing of Berea Sand in a region where that horizon has not generally been found makes it a test of more than passing importance.

Prospective Oil and Gas Areas, Jefferson District.—On the basis of the records published on the preceding pages and considering the relationship of these wells to the geologic structure, the following localities are suggested for future

drilling: (1), The showing of Maxton Sand oil in the **H. O. Havener No. 2 (6) Well** on Twentymile Creek would indicate a possible pool of oil in that vicinity, and while other wells in the same vicinity apparently did not find the same pay streak it would appear that a test drilled along the wide structural terrace between the 900-foot and 925-foot green structure contours in the region north of Gauley River between Belva and Swiss would be justified. (2), The presence of gas in the Big Lime along the western slope of the Mann Mountain Anticline apparently defines a considerable field well worth drilling, its western limit being represented by an imaginary line drawn from Swiss northeastward to the head of Peach-orchard Branch of Twentymile Creek. Whether the field would extend southeastward from Swiss to the Fayette County Line at the point where the anticline crosses Gauley is largely a matter of conjecture, but the structure is favorable for such a continuation. (3), The presence of a large quantity of gas in the **Lewis Coal and Land Company No. 1 (12) Well**, located on Twentymile Creek, slightly east of the axis of the Mann Mountain Anticline would indicate further profitable wells on that side of the fold but the slight showing in the **E. V. Shelton No. 101 (14) Well** would make it appear the pay might be mainly confined to a narrow strip, one-half mile or more in width immediately east of the axis. (4), The presence of Berea Sand in the Shelton Well (14) would indicate that a well drilled to the same horizon near the 1200-foot green structure contour on Left Fork of Line Creek might have some hope of oil, as the terrace formation in that locality is favorable to the accumulation of oil in a non-water-bearing sand. Owing to the lack of gas in the Shelton well, however, the hazard of such a test would be large.

DETAILED WELL RECORDS AND PROSPECTIVE AREAS, GRANT DISTRICT.

Grant District lies east of Jefferson, being a rough rectangle reaching from Gauley River northwestward to the Clay County Line. Its structure is mainly that of a long monocline, interrupted in the southeastern corner by the Clifftop Syncline, a shallow and barely perceptible basin that

extends across it in a northeast-southwest direction, and by the northern ends of the Mann Mountain Anticline and Lockwood Syncline that touch its extreme northwestern corner. No wells have been drilled within the boundaries of the district but the following test is located in Clay County, less than one-half mile from the district line:

Davenport & Elliott No. 1 Well Record (15).

Henry District, Clay County, on a short branch of Leatherwood Creek, 2.2 miles northwest of Hattie; authority, Elkland Oil and Gas Company; completed in 1917; elevation, 1210' B.; hole starts 187 feet below the Lower Kittanning (No. 5 Block) Coal and 92 feet below the Kanawha Black Flint (hand-level measurement).

	Thickness. Total.	
	Feet.	Feet.
Conductor	32	32
Sand	33	65
Coal, Winifrede.....	5	70
Slate	15	85
Sand	60	145
Slate	10	155
Sand, Upper Cedar Grove.....	58	213
Coal, Cedar Grove.....	5	218
Sand	12	230
Slate	20	250
Sand, Monitor.....	18	268
Slate	15	283
Sand, Brownstown.....	97	380
Slate	20	400
Sand, Eagle.....	25	425
Slate	10	435
Coal, Eagle.....	8	443
Sand	37	480
Coal, Little Eagle.....	5	485
Sand	10	495
Slate	15	510
Sand	5	515
Coal, Little Cedar.....	5	520
Sand, Lower War Eagle.....	15	535
Slate	25	560
Sand, Upper Gilbert.....	40	600
Slate	25	625
Brown shale	12	637
Sand, Lower Gilbert (a small amount of gas at 639'; 10 bailers salt water per hour at 675')	52	689
Slate	11	700
Hard shells.....	25	725
Sand, Dotson.....	75	800
Slate	27	827
Sand, Upper Nuttall, (a small amount of gas at 864').....	123	950

	Thickness.	Total.
	Feet.	Feet.
Slate	10	960
Lime	80	1040
Salt Sand, Lower Nuttall.....	50	1090
Lime, gritty.....	117	1207
Sand, Guyandot, Rosedale Gas.....	113	1320
Slate	70	1390
Sand, Upper Raleigh, Rosedale Salt, (hole filled with salt water, 1460').....	150	1540
Red rock.....	20	1560
Lime	35	1595
Sand, Maxton.....	68	1663
Lime shells.....	86	1749
Red rock.....	21	1770
Slate	16	1786
Little Lime (gas at 1790').....	16	1802
Pencil Cave.....	28	1830
Big Lime (gas at 1990').....	215	2045
Sand, red, Keener (gas show, 2049').....	5	2050
Slate and lime shells.....	110	2160
Sand, Squaw (gas pocket).....	15	2175
Slate and lime shells to bottom.....	331	2506
Casing record: 10", 268'; 8¼", 1245'; 6½" in Little Lime.		

"At 2165' a pocket of gas, approximately 6,000,000 cubic feet, in 10 minutes had blown out, blew the tools from the bottom of hole. Gas in Little Lime at 1790' possibly 200,000 feet; about same amount in Big Lime at 1990'."

The Elk River Coal and Lumber Company No. 1865 (16) Well, drilled by the Hope Natural Gas Company on Sinnott Branch of Buffalo Creek, in Henry District, Clay County, 4 miles southeast of Clay and 4 miles from the Nicholas County Line, the detailed record of which is published in the Braxton and Clay Report of the Survey, pages 135-136, was abandoned as a dry hole, there being a slight show of gas in shells that probably represent the Berea Sand at 2230 feet.

Prospective Oil and Gas Areas, Grant District.—Viewing the structure of Grant District in conjunction with the scanty development in surrounding regions, the following localities are suggested as offering hope of possible production: (1), The northwest corner along the axis of the Mann Mountain Anticline should apparently have some gas in the Big Lime. (2), The gas production from the Rosedale Salt Sand in the Allen Rader No. 1 (20) and Allen Rader No. 2 (21) Wells, the records of which are published on subsequent pages, would indicate that the same belt might extend southwestward into Grant District along or near the line of strike

represented by the 1500-foot green structure contour. (3), There might possibly be oil in the Berea Sand along the Clifftop Syncline, although the absence of this sand at various tests in the same general region would make its presence there a matter of much uncertainty.

DETAILED WELL RECORDS AND PROSPECTIVE AREAS, SUMMERSVILLE DISTRICT.

Summersville District lies east of Grant, being roughly rectangular in form, and extending from Gauley River north-westward to the Clay County Line. Its structure is mainly a continuation of the same general monocline that features Grant District, its uniform slope being interrupted by the Enon Anticline, a low fold in its northern half, and by the Clifftop Syncline which enters the district from the southwest but dies out against the slope. Five wells have been drilled within the district, two of which are producing gas, the other three being dry.

In addition to the five wells mentioned the **Elk River Coal and Lumber Company No. 1341 (17) Well**, drilled by the Hope Natural Gas Company, on Dog Run of Buffalo Creek, Buffalo District, Clay County, 1.2 miles northwest of Enoch and 2.5 miles from the Nicholas County Line, the record of which is published in the Braxton and Clay Report of the Survey, pages 354-355, was a deep test, there being only a few slight shows of gas and oil, mainly in the lenticular sands of the Mauch Chunk Series, and in red rock which occurs at the Big Injun horizon.

The following well was a deep test, starting 75 feet below the Kanawha Black Flint according to Ray V. Hennen, its record having been published in the Braxton and Clay Report of the Survey, pages 365-367. Certain changes in correlation have been made, as the coals doubtfully classified as the Eagle and Sewell would appear to represent the Gilbert and Hughes Ferry, respectively. In the case of the former the interval of 739 feet below the Kanawha Black Flint is far too large for the Eagle Coal in that locality, and the position of the latter coal with reference to the base of the Pottsville would put it 200 feet or more above the Sewell horizon. No

shows of oil or gas are recorded in the hole:

Elk River Coal and Lumber Co. No. 1340 Well Record (18).

Summersville District, on north bank of Jim Young Fork, $\frac{1}{4}$ mile southeast of Clay-Nicholas Line, and 1.9 miles northwest of Dade; drilled by the Hope Natural Gas Company; authority, J. G. Bradley and the United Fuel Gas Company; completed in 1909; elevation, 1385' B.; hole starts 75 feet below the Kanawha Black Flint.

	Thickness.	Total.
	Feet.	Feet.
Conductor and gravel.....	28	28
Sand, (hole full of water).....	21	49
Coal, Winifrede.....	2	51
Lime	10	61
Sand	44	105
Lime	17	122
Slate	3	125
Coal, Chilton.....	2	127
Lime	35	162
Coal, Williamson?	2	164
Lime	36	200
Lime, black.....	15	215
Sand	10	225
Lime	35	260
Sand	15	275
Lime	25	300
Slate	5	305
Lime	30	335
Sand	22	357
Lime	18	375
Slate	10	385
Lime	32	417
Slate	27	444
Lime	31	475
Sand	10	485
Slate	20	505
Lime	159	664
Coal, Gilbert.....	2	666
Sand	68	734
Slate	10	744
Sand	11	755
Slate	10	765
Lime	10	775
Slate	10	785
Lime	10	795
Slate	5	800
Lime	15	815
Slate	5	820
Lime	20	840
Slate	10	850
Sand	40	890
Coal, Hughes Ferry, (1 bailer water per hour at 950').....	2	892

	Thickness. Feet.	Total. Feet.
Sand	78	970
Slate	90	1060
Lime	20	1080
Sand, Rosedale Gas.....	60	1140
Slate	60	1200
Sand, Rosedale Salt.....	90	1290
Lime	35	1325
Slate	85	1410
Lime	30	1440
Slate	5	1445
Sand	55	1500
Red rock.....	60	1560
Lime	25	1585
Red rock.....	25	1610
Lime	10	1620
Slate	5	1625
Lime	5	1630
Slate	10	1640
Sand	30	1670
Slate	20	1690
Lime	10	1700
Slate	5	1705
Sand	20	1725
Slate	40	1765
Lime	25	1790
Slate	25	1815
Pencil Cave.....	13	1828
Big Lime.....	215	2043
Red rock.....	22	2065
Slate	25	2090
Lime, gritty.....	30	2120
Slate	140	2260
Slate and shells.....	360	2620
Lime	480	3100
Slate and shells to bottom	215	3315

"Casting record: 13", 171'; 10", 1102 $\frac{1}{3}$;', 8 $\frac{1}{4}$ ", 1784 $\frac{1}{2}$ '; 6 $\frac{5}{8}$ ", 1894' 7"."

The Elk River Coal and Lumber Company No. 1577 (19) Well, drilled by the Hope Natural Gas Company on Beech Fork of Lilly Fork, 1 mile southeast of Dade, the detailed record of which is published in connection with the Dade Section, page 130, was only 1865 feet deep, recording no oil or gas, but being negative in regard to the deep sands as it failed to reach the Big Lime. The two following wells were good gassers in the Rosedale Salt Sand:

Allen Rader No. 1 Well Record (20).

Summersville District, on Buck Garden Creek, 2.3 miles northeast

of Gilboa; authority, Enon Oil and Gas Company, through Allen Rader; completed in 1911; elevation, 1500' B.; hole starts about 35 feet below Eagle Coal.

	Thickness.	Total.
	Feet.	Feet.
Conductor	13	13
Slate and shells	47	60
Lime, hard (water, 63')	40	100
Sand, hard	25	125
Slate, white	15	140
Lime, hard	10	150
Sand, hard, Lower Gilbert	50	200
Slate, black	40	240
Lime, hard	40	280
Sand, hard (water, 333')	55	335
Coal, Lower Douglas	1	336
Slate, black	14	350
Lime, hard	14	364
Slate and shells	38	402
Sand, hard, Lower Nuttall	96	498
Slate, dark	6	504
Sand, dark	18	522
Slate, dark	5	527
Sand, white	3	530
Coal, Hughes Ferry	9	539
Sand, white	29	568
Slate and shells	18	586
Limestone	64	650
Slate, white	18	668
Lime, gritty	44	712
Slate and shells	33	745
Slate, white	45	790
Lime, hard	60	850
Slate, white	26	876
Limestone	18	894
Pink rock	28	922
Slate, black	58	980
Slate, white, and shells	84	1064
Limestone	21	1085
Slate	15	1100
Sand, hard, Rosedale Salt, (Upper Raleigh) (gas, 1106' and 1120')	28	1128
"Casing record: 10", 73'; 8", 586'."		

The above well was reported to have had a volume of 1,500,000 cubic feet of gas daily, according to Mr. Rader, having made a rock pressure of 200 pounds in 1917, six years after its completion.

Allen Rader No. 2 Well Record (21).

Summersville District, on Buck Garden Creek, 2.6 miles northeast of Gilboa; authority, Enon Oil and Gas Company, through C. E. Krebs, of Charleston; completed in 1911; elevation, 1535' B.; hole starts about the level of the Eagle Coal.

	Thickness.	Total.
	Feet.	Feet.
Unrecorded	80	80
Coal, Cedar?	5	85
Unrecorded	145	230
Sand, hard	25	255
Unrecorded	90	345
Sand, Upper Nuttall	35	380
Unrecorded	70	450
Sand, Lower Nuttall	135	585
Unrecorded	95	680
Sand	60	740
Unrecorded	155	895
Sand, Salt, (one bailer of water, 910')	50	945
Unrecorded	240	1185
Sand, Rosedale Salt (gas, 1192-1209'; water, 1220')	55	1240
Slate and shells	80	1320
Sand, Maxton	80	1400
Slate	125	1525
Little Lime	55	1580
Pencil Cave	38	1618
Big Lime	248	1866
Red rock	20	1886
Slate, white	94	1980
Lime	50	2030
Slate and shells	265	2295
Lime	30	2325
Slate, white	35	2360
Slate and shells to bottom.....	390	2750

According to Mr. Rader, the above well had a gas volume amounting to 3,000,000 cubic feet daily, but this production was lost in an unfortunate attempt to find oil at a lower depth.

Joseph Sebert No. 1 Well Record (22).

Summersville District, on Peters Creek, 0.2 mile northeast of Enon; authority, L. B. Chidester et al., through Dr. D. P. Kessler, of Cowen, W. Va.; elevation, 1530' B.; hole starts 15 feet below top of the Lower Gilbert Sandstone or 220 feet below the Eagle Coal.

	Thickness.	Total.
	Feet.	Feet.
Conductor	12	12
Sand, hard, (hole full of water, 35') Lower Gilbert	23	35
Slate	5	40
Sand, hard and white, Dotson.....	90	130
Slate and shells.....	24	154
Showing of coal, Douglas	2	156
Limestone	44	200

	Thickness.	Total.
	Feet.	Feet.
Sand and shells.....	45	245
Slate, black.....	20	265
Lime and slate.....	80	345
Slate, soft, black.....	5	350
Sand, hard, Harvey.....	90	440
Slate, black.....	40	480
Sand, hard, Rosedale Gas (Lower Guyandot)	20	500
Slate.....	6	506
Coal, Sewell	6	512
Slate, black, (cased at 597').....	85	597
Lime.....	48	645
Slate, white.....	15	660
Lime, gritty.....	25	685
Slate and shells.....	25	710
Lime.....	20	730
Slate, black.....	50	780
Lime.....	90	870
Slate, black.....	114	984
Lime.....	46	1030
Red rock.....	60	1090
Lime.....	40	1130
Red rock.....	80	1210
Lime.....	30	1240
Red rock.....	10	1250
Lime.....	50	1300
Red rock.....	25	1325
Lime.....	35	1360
Slate, gray.....	20	1380
Red rock.....	30	1410
Slate and shells.....	20	1430
Red rock.....	30	1460
Slate and shells.....	45	1505
Lime.....	35	1540
Slate.....	70	1610
Pencil Cave (cased at 1621').....	11	1621
Big Lime (little gas at 1621').....	244	1865
Red rock.....	25	1890
Slate and shells.....	260	2150
Lime, gritty.....	25	2175
Shale and shells to bottom.....	725	2900

The above well made only a slight show of gas in the Big Lime and was abandoned as a dry hole, the horizon of the Rosedale Salt Sand, which was productive in the Kader wells, being represented by black slate. A strong stream of slightly sulphurous water, very palatable for drinking purposes, flows from the hole.

Prospective Oil and Gas Areas, Summersville District.—

The structure of Summersville District, viewed in conjunction with the tests already made, would indicate that further

drilling in the following localities might have favorable results: (1), The region northeastward from the **Rader Wells (20 and 21)** and between the 1500-foot and 1600-foot green structure contours would appear to be favorable for gas from the Rosedale Salt Sand. (2), The square mile of territory lying along the flattened nose of the Enon Anticline between the 1400-foot and 1500-foot green contours may hold gas in the Rosedale Salt Sand or the Big Lime, as the **Elk River Coal and Lumber Company No. 1577 (19) Well** did not reach the latter member and therefore does not condemn this locality. (3), Gas may possibly be found in the Big Lime along the axis of the Enon Anticline just west of Pine Run of Peters Creek, as the **Joseph Sebert No. 1 (22) Well**, located on the western slope of this fold, made a show from that member. (4), The deep basin along the axis of the Clifftop Syncline where that fold crosses McClung Branch of Peters Creek southeast of Enon is structurally favorable for Berea Sand oil provided the sand is present, but as this member was not found in the **Sebert Well (22)** an attempt to find it there might result in failure. In support of such a location it may be stated that, for reasons not clearly understood, sedimentary beds often differ materially on the opposite sides of an anticline, and the Enon Anticline offers the necessary intervening fold leading to this hope.

DETAILED WELL RECORDS AND PROSPECTIVE AREAS, HAMILTON DISTRICT.

Hamilton District, covering a large expanse of territory, lies east of Summersville and extends from Gauley River northwestward to the Clay and Braxton County Lines. Its main structural feature is that of a long monocline, dipping northwestward, and interrupted by only a few slight reversals and terraces. Three deep wells have been drilled within its boundaries, of which one showed sufficient gas that it could have been made a producer, one was dry, and the other made a slight show of oil.

The **Henry McQueen No. 1 (23) Well**, drilled by the Nicholas Oil and Gas Company on Brushy Fork of Muddlety Creek, 0.8 mile northeast of Hookersville, the detailed record

of which has been published in connection with the Hookersville Section, page 149, made gas in the Rosedale Salt Sand and shows of the same in the Big Lime and Big Injun and a show of oil in the Squaw Sand, but was plugged and abandoned apparently because of its remoteness from pipe-lines or markets. It was drilled to a total depth of 2500 feet but found no Berea Sand.

The **Elk River Coal and Lumber Company No. 1553 (24) Well**, drilled by the Hope Natural Gas Company on Road Fork of Strange Creek, 1.4 miles southeast of Dille, the detailed record of which is published in connection with the Dille Section, pages 136-7, made no show of oil or gas, 109 feet of Big Injun Sand being recorded at the bottom of the hole.

The **J. N. Dodrill Sulphur Well (25)**, located on Birch River at the mouth of Anthony Creek, has already been described, page 373, there being a small amount of gas at an unknown but shallow depth.

The **J. N. Dodrill No. 1 (26) Well**, drilled by the Nicholas Oil and Gas Company on Birch River at the mouth of Anthony Creek, was approximately 2700 feet deep, according to Mr. Dodrill, there being a trace of oil at 1400 feet. Its detailed record was not secured. Salt sulphur water flows from it in copious quantity.

Prospective Oil and Gas Areas, Hamilton District.—The comparatively smooth, monoclinical structure of Hamilton District offers little clue regarding possible pools of oil or gas but in view of the tests already made and such irregularities of structure as appear, the following localities are suggested for further drilling: (1), The showing of gas made in the Rosedale Salt, Big Lime, and Big Injun Sands in the **Henry McQueen No. 1 (23) Well**, near Hookersville, would indicate that other wells along the same terrace, between the 1650-foot and 1700-foot green structure contours, and on the slight dome one mile or more north of Opal, might find a profitable amount of gas from some of these horizons. (2), The cove-like terrace on Clear Fork of Muddlety Creek below Falls Run is structurally favorable for oil and if gas in quantity should be found on the dome west of it a test in this locality could be recommended. (3), The terrace along Pop-

lar Creek immediately south of Left Fork is another structure that would be favorable for oil in case gas should be found farther up the structural slope.

**DETAILED WELL RECORDS AND PROSPECTIVE AREAS,
BEAVER DISTRICT.**

Beaver District, lying east of Hamilton and next to Webster County, and extending across Gauley River to the corner of Nicholas, Webster, and Greenbrier Counties, is featured by the same monoclinical structure that occurs in Hamilton District, being broken only by slight terraces and by the Webster Springs Anticline which cuts across its extreme southeastern corner. No wells have been drilled, but two tests just across the line in Webster County afford some light on the sands.

Floyd Morton No. 1 Well Record (27).

Glade District, Webster County, on Strouds Creek, 1 mile north-west of Allingdale; authority, Richard V. Dennison; drilling started September 9, 1914; elevation, 2070' B.; hole starts about 150 feet below the Eagle Coal horizon.

	Thickness.	Total.
	Feet.	Feet.
Slate	105	105
Sand, Lower Gilbert (hole full of water, 211')	113	218
Slate, black.....	16	256
Sand shells.....	4	240
Slate, black.....	16	256
Unrecorded	2	258
Sand, broken, Upper Nuttall (coal blossom at 318').....	65	323
Slate, black.....	51	374
Sand, Lower Nuttall.....	76	450
Slate, black.....	30	480
Coal, Hughes Ferry.....	1	481
Sand	25	506
Slate, black.....	5	511
Lime	36	547
Shells, lime, and sand.....	33	580
Coal, Sewell.....	2	582
Sand	17	599
Slate, black.....	19	618
Shells, sand (Rosedale Salt), and slate.....	92	710
Slate	80	790
Sand, white, Princeton Conglomerate.....	100	890
Slate, black.....	41	931
Sand, hard.....	17	948
Sand, shells, and slate.....	50	998

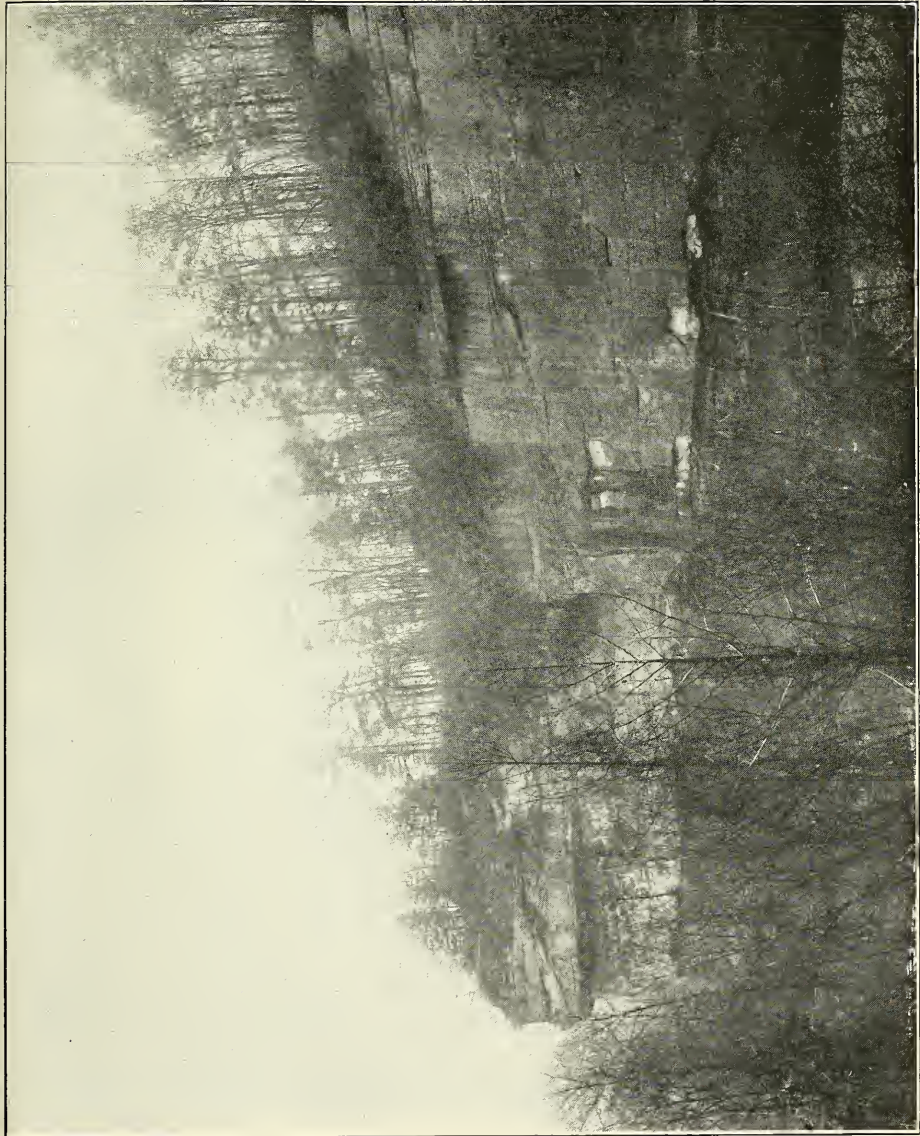


PLATE XVII. — Lower Nuttall Sandstone from Hughes Ferry Bridge, 3 miles south of Summersville.
Photo by E. E. Harris.

	Thickness.	Total.
	Feet.	Feet.
Shale, red, interspersed with sand shells.....	510	1508
Sand, hard, Maxton.....	87	1595
Slate	42	1637
Lime, broken, Hinton, Little Lime?.....	73	1710
Slate	9	1719
Lime, hard, Little Lime.....	13	1732
Slate (very bad cave, 1763-1773'), Pencil Cave	41	1773
Lime, black, hard..... 25' } Big Lime.....	227	2000
Slate	9	
Lime, gray, gritty.....193 }		
Unrecorded to bottom of hole.....	170	2170

The above well made no show of oil or gas but was not drilled deep enough to test the Berea Sand.

The J. N. Camden No. 1 (28) Well, drilled by the owner at Camden-on-Gauley, Glade District, Webster County, the record of which has already been published in connection with the section for Camden-on-Gauley, pages 154-6, was completed through the Big Injun, Weir, and Berea Sands, without finding oil or gas, its total depth being 2501 feet.

Prospective Oil and Gas Areas, Beaver District.—From a structural standpoint the two following localities would appear to be the best in Beaver District: (1), The terrace formation approximately $1\frac{1}{2}$ miles northwest of Delphi might possibly hold some oil or gas. (2), The extreme southeastern corner of the district, where the Webster Springs Anticline cuts across it, is structurally favorable for gas, but the close proximity of this location to the mountain folds of the Greenbrier Valley would apparently make such a test a hazardous one.

DETAILED WELL RECORDS AND PROSPECTIVE AREAS, RICHWOOD DISTRICT.

Richwood District occupies only a few square miles of territory lying southeast of Beaver District and next to the Greenbrier County Line, its structure being monoclinical except at the extreme eastern end where the Webster Springs Anticline crosses it. No tests for oil and gas have been made. The only locality that would seem at all hopeful for gas would be along the anticline mentioned, but, as already

stated, drilling in a region so close to the mountain uplifts would be attended with great financial risk.

**DETAILED WELL RECORDS AND PROSPECTIVE AREAS,
KENTUCKY DISTRICT.**

Kentucky District lies south of Gauley and southwest of Beaver District, its southern boundary joining Greenbrier County. Its structure is entirely monoclinal, there being no reversals of dip and no terraces of consequence, according to the contours on the Sewell Coal. Owing to the great northward convergence of the Greenbrier and Mauch Chunk Series, however, the surface structure affords only an indefinite clue to the dip of the sands below the Big Lime and it may be possible that favorable terrace structure may exist in unknown localities but it does not seem possible that there are any reversals of dip. Only one well has been drilled in the district.

The **Gauley Coal Land Company No. 1 (29) Well**, drilled by the Wick Oil and Gas Company at Deepwell on Deer Creek, the record of which has been published in connection with the section for Deepwell (Northwest), pages 167-9, had a total depth of 3841 feet, finding an oil show in what is doubtfully correlated as the Warren First Oil Sand. Owing to the fact that this sand is not known to have commercial production of oil or gas in the State, the slight showing of oil at this point can not be regarded as indicative of a pool. No Berea Sand was found but the Big Injun was 50 feet thick.

Owing to the negative character of the surface structure no outline of favorable localities for drilling would be justified. There may possibly be some oil and gas in the district but a large amount of expensive prospecting would probably be required to find it.

**DETAILED WELL RECORDS AND PROSPECTIVE AREAS,
WILDERNESS DISTRICT.**

Wilderness District lies west of Kentucky, joining Greenbrier County on the south and Fayette on the west. Its surface structure is mainly that of the same monocline that features Kentucky District, interrupted only by the very shal-

low Clifftop Syncline that extends across its extreme north-western corner. If terraces exist on the oil sands their presence is not reflected by the contours on the Sewell Coal. Two wells have been drilled in the district, both of which were dry holes.

Gauley Coal Land Company No. 2 Well Record (30).

Wilderness District, on Sugar Branch of Hominy Creek, 1 mile southwest of Hominy Falls; authority, Wick-Laing Oil and Gas Company; elevation, 2410' B.; hole starts a few feet above the top of the Guyandot Sandstone.

	Thickness. Total.	
	Feet.	Feet.
Conductor	17	17
Sand, Guyandot.....	75	92
Coal, Sewell "B".....	2	94
Slate and shell.....	56	150
Coal, Sewell.....	3	153
Slate and shell.....	322	475
Coal, Fire Creek.....	3	478
Red rock.....	182	660
Lime	6	666
Red rock.....	79	745
Sand, Princeton Conglomerate.....	155	900
Slate, to bottom.....	4	904
Casing record: 6", 75'.		

The Gauley Coal Land Company (Granville O'Dell Tract) No. 1 (31) Well, drilled by the Wick-Laing Oil and Gas Company on the west side of Hominy Creek, 1.4 miles south of Hominy Falls, the detailed record of which is published in connection with the section for Hominy Falls, pages 175-7, had a total depth of 3753 feet, there being no sands below what appears to be the Berea which was found at 2540 feet with a thickness of 102 feet. A show of gas was found in the Princeton Conglomerate at 694 feet, but elsewhere the hole was dry.

Owing to the negative character of the surface structure and the tests already made, forecasts of possible fields in Wilderness District would not be justified. The great amount of Berea Sand found at Hominy Falls, however, is an encouraging feature, and it might be possible that an extensive drilling campaign would find some production.

CHAPTER X.

COMMERCIAL COAL,

GENERAL STATEMENT.

In Chapters V to VII, inclusive, a systematic description of all the coal seams found in Nicholas County has been given, together with their correlations. Some of the smaller beds that are not of commercial importance have been fully described, giving measured sections at openings and prospects. In the present Chapter numerous actual measured sections will be published for those coals that are of minable thickness and purity, and estimates will be given of their probable tonnage, with etchings showing their areal extent. At the end of the Chapter there is a table of analyses, showing the chemical composition of all coals tested by the Survey, and also a second table showing tests made by the Tioga Lumber Company.

Within the county there are 17 coals that appear to have minable thickness and 27 others that are too thin, impure, or irregular to be of more than local value, several of these latter being of only scientific interest as stratigraphic markers. The minable seams, in descending order, are the Lower Freeport, Upper Kittanning, Middle Kittanning, Lower Kittanning (No. 5 Block), and Clarion of the Allegheny Series; the Stockton (Lower Mercer), Coalburg, Winifrede, Chilton, Alma, Campbell Creek (Peerless Bench), Campbell Creek (No. 2 Gas Bench), Eagle, Little Eagle, and Gilbert of the Kanawha Group, or Upper Pottsville; and the Sewell and Fire Creek of the New River Group, or Lower Pottsville Series.

Figure 4 shows the different coal seams of Nicholas, giving not only their relative thickness, but also the maximum interval between them. Figures 5 to 21, inclusive, published in the present Chapter, will show, approximately, where each of the commercial seams occurs in minable thickness.

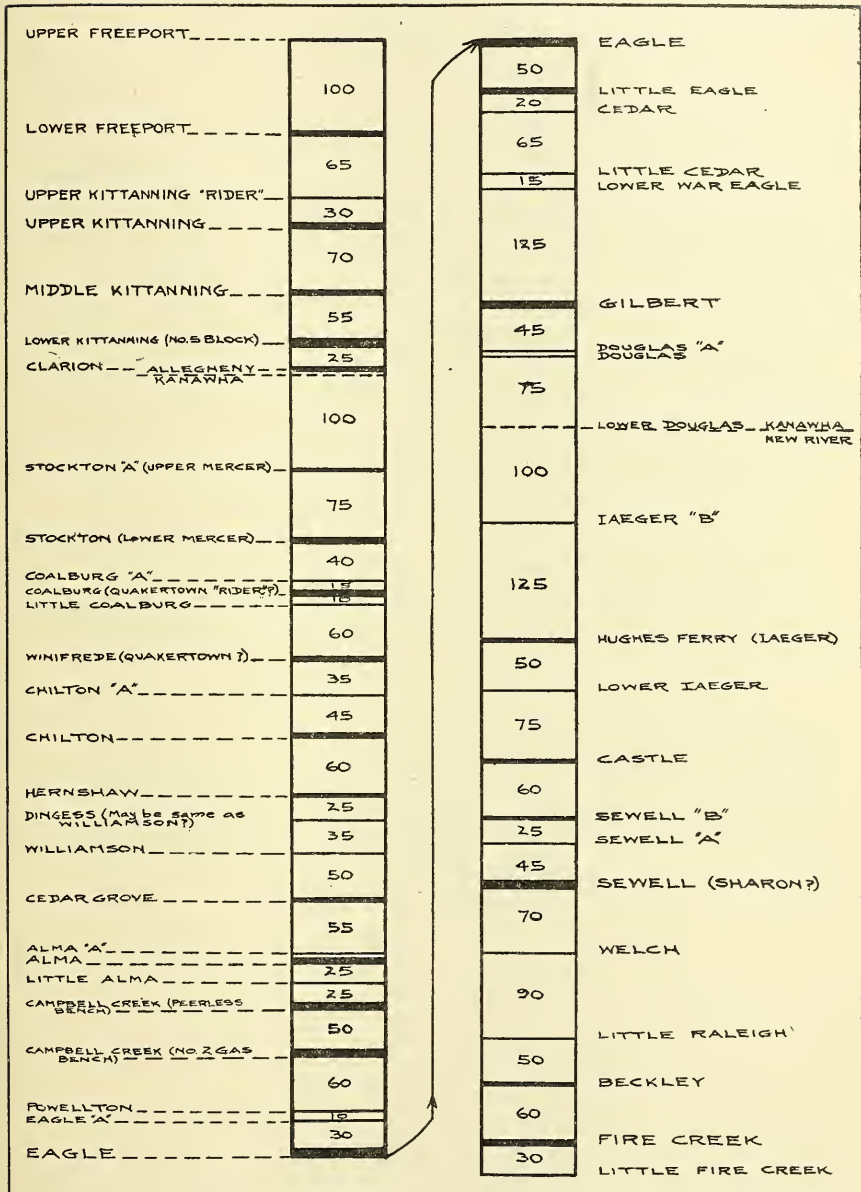


FIGURE 4.- DIAGRAM SHOWING RELATIVE POSITION OF COAL SEAMS.

R.C.T.

STATISTICS OF COAL PRODUCTION.

Nicholas County, although possessing an immense amount of good coal, has only a small number of commercial mines. Aside from temporary logging roads, railway transportation is confined to two narrow belts, one along the eastern and the other along the western edge, several small mines being in active operation in these two regions. Elsewhere coal has been mined by the lumber companies at various points to supply railroad, furnace, and domestic fuel, their operations having been of a temporary character, and having been generally abandoned when the mills were moved away. Small commercial mines are in operation on the Lower Kittanning (No. 5 Block) and Clarion Coals in the vicinity of Tioga, on the Coalburg, Campbell Creek (Peerless Bench), and Eagle Coals on the waters of Twentymile Creek, and on the Sewell seam along Laurel Creek of Cherry River in the vicinity of Saxman. All of these mines are drift openings, mining directly on the outcrop of the coal. No coke ovens are in operation.

The following table, assembled from statistics furnished by Hon. W. J. Heatherman, Chief of the State Department of Mines, gives the coal production of the county since mining was begun in the year 1902, together with the ranking of Nicholas as compared to other counties during the same years:

Coal Production of Nicholas County from 1902 to 1917, Inclusive.

Year.	Long Tons. (2240 Lbs.)	Short Tons. (2000 Lbs.)	Rank.
1902.....	12,190.....	13,653.....	22nd
1903.....	7,645.....	8,562.....	24th
1904.....	25,723.....	28,810.....	24th
1905.....	51,524.....	57,707.....	25th
1906.....	50,921.....	57,031.....	25th
1907.....	57,412.....	64,301.....	25th
1908.....	61,806.....	69,223.....	26th
1909.....	40,556.....	45,423.....	27th
1910.....	59,445.....	66,578.....	26th
1911.....	98,257.....	110,048.....	24th
1912.....	46,135.....	51,671.....	29th
1913.....	88,342.....	98,943.....	27th
1914.....	96,440.....	108,013.....	26th
1915.....	122,264.....	136,936.....	27th
1916.....	182,854.....	204,796.....	25th
1917.....	176,455.....	197,630.....	28th
Total.....	1,177,969	1,319,325	

The following table shows the coal production of the various companies operating in Nicholas County for the year ending June 30, 1917:

Company	Mine	Long Tons (2240 Lbs.)	Short Tons (2000 Lbs.)
Coalbell Coal Co.....	Trees and Flinn.....	70,471	78,928
Greenbrier Coal Co.....	Eagle.....	300	336
Greendale Mining Co.....	Greendale.....	12,600	14,112
Pardee & Curtin Lumber Co..	Camp No. 21....	6,779	7,592
Pardee & Curtin Lumber Co..	Panther Creek...	3,739	4,188
Saxman Coal & Coke Co.....	Saxman.....	82,566	92,474
Total.....		176,455	197,630

RECORDS OF COAL TEST BORINGS.

SUMMARIZED COAL TEST RECORDS.

In Nicholas 50 tests for coal have been bored, of which the writer has knowledge, all of them having been definitely located on Map II and their surface levels secured. Doubtless others have been made since the completion of field work in the county in the fall of 1917 but of these, if any, the writer has no information. Eight others, having direct bearing on

Summarized Record of Tests

No. on Map II	Name of Property	Magisterial District	Company
1	Jno. Q. Dickinson No. 2.....	Cabin Creek (Kanawha) ..	J. Q. Dickinson.....
2	Lackawanna No.	Jefferson.....	C. C. Sharp.....
3	Lackawanna No. 1.....	Pleasant (Clay).....	C. C. Sharp.....
4	Hartland Col. Co. No. 2.....	Pleasant (Clay).....	Hartland.....
5	Lewis C. & L. Co. No. 1.....	Jefferson.....	Lewis C. & L.....
5A	J. Q. Dickinson, No. 1.....	Jefferson.....	J. Q. Dickinson.....
5B	J. Q. Dickinson, No. 2.....	Jefferson.....	J. Q. Dickinson.....
6	Lewis C. & L. Co. No. 2.....	Grant.....	Lewis C. & L.....
7	Lewis C. & L. Co. No. 3.....	Grant.....	Lewis C. & L.....
8	Lewis C. & L. Co. No. 4.....	Grant.....	Lewis C. & L.....
9	Elk River C. & L. Co. No. 1.....	Henry (Clay).....	Elk River C. & L.....
10	B. Frank Grose No. 1.....	Grant.....	C. C. Sharp.....
11	Jacob Smith No. 1.....	Hamilton.....	Laing Mining.....
12	David Pletcher No. 1.....	Hamilton.....	Herold & Porter.....
13	Elk River C. & L. Co. No. 2.....	Buffalo (Clay).....	Elk River C. & L.....
14	W. W. Murphy No. 1.....	Buffalo (Clay).....	Perkins & Emmart.....
15	Perry Wilson Hrs. No. 1.....	Hamilton.....	Perkins & Emmart.....
16	Perry Wilson Hrs. No. 2.....	Hamilton.....	Perkins & Emmart.....
17	Perry Wilson Hrs. No. 3.....	Hamilton.....	Perkins & Emmart.....
18	Lewis Boggs No. 1.....	Hamilton.....	Perkins & Emmart.....
19	A. E. Henderson No. 1.....	Hamilton.....	Enterprise.....
20	Enterprise Coal Co. No.....	Hamilton.....	Enterprise.....
21	Tioga Lumber Co. No. 1.....	Hamilton.....	Tioga Lumber.....
22	Tioga Lumber Co. No. 2.....	Hamilton.....	Tioga Lumber.....
23	Tioga Lumber Co. No. 3.....	Glade (Webster).....	Tioga Lumber.....
24	A. J. Pettigrew No. 1.....	Beaver.....	G. W. Boggs.....
25	Gauley C. L. Co. No.....	Kentucky.....	W. Va. C. & C.....
26	Gauley C. L. Co. No.....	Kentucky.....	W. Va. C. & C.....
28	Balto. & Ohio R. R. Co. No. 21.....	Kentucky.....	W. Va. C. & C.....
27	Gauley C. L. Co. No. 24.....	Kentucky.....	W. Va. C. & C.....
29	Gauley C. L. Co. No. 23.....	Kentucky.....	W. Va. C. & C.....
30	Gauley C. L. Co. No. 23A.....	Kentucky.....	W. Va. C. & C.....
31	Gauley C. L. Co. No.....	Kentucky.....	W. Va. C. & C.....
32	Gauley C. L. Co. No.....	Kentucky.....	Gauley C. L.....
33	Gauley C. L. Co. No.....	Kentucky.....	W. Va. C. & C.....
34	Gauley C. L. Co. No. 10.....	Kentucky.....	Laing Mining.....
35	Gauley C. L. Co. No. 9.....	Kentucky.....	Laing Mining.....
36	J. B. Jones No. 1.....	Kentucky.....	Laing Mining.....
37	Gauley C. L. Co. No.....	Kentucky.....	Gauley C. L.....
38	Gauley C. L. Co. No.....	Kentucky.....	E. F. Saxman.....
39	Gauley C. L. Co. No.....	Kentucky.....	W. Va. C. & C.....
40	Gauley C. L. Co. No. 10 (?).....	Kentucky.....	W. Va. C. & C.....
41	Gauley C. L. Co. No.....	Kentucky.....	W. Va. C. & C.....
42	Gauley C. L. Co. No.....	Kentucky.....	Gauley C. L.....
43	Gauley C. L. Co. No.....	Kentucky.....	Gauley C. L.....
44	Gauley C. L. Co. No.....	Kentucky.....	W. Va. C. & C.....
45	Gauley C. L. Co. No.....	Kentucky.....	W. Va. C. & C.....
46	Gauley C. L. Co. No. 17.....	Kentucky.....	W. Va. C. & C.....
47	Gauley C. L. Co. No. 27.....	Kentucky.....	W. Va. C. & C.....
48	Gauley C. L. Co. No.....	Kentucky.....	W. Va. C. & C.....
49	Gauley C. L. Co. No. 8.....	Kentucky.....	W. Va. C. & C.....
50	Gauley C. L. Co. (G. O'Dell) No.....	Wilderness.....	Gauley C. L.....
51	Gauley C. L. Co. No.....	Wilderness.....	Gauley C. L.....
52	Gauley C. L. Co. No.....	Wilderness.....	Gauley C. L.....
53	Nuttall Hrs. No.....	Nuttall (Fayette).....	Nuttall Hrs.....
54	Nuttall Hrs. No.....	Nuttall (Fayette).....	Nuttall Hrs.....
55	Nuttall Hrs. No.....	Nuttall (Fayette).....	Nuttall Hrs.....
56	Mrs. E. T. Martin.....	Meadow Bluff (Greenbrier) ..	Nutter Hrs.....

Elevation above Tide. Feet	Campbell Creek (Peerless Bench) Coal		Eagle Coal		Hughes Ferry Coal		Sewell Coal		Fire Creek Coal		Total Depth, Feet	No. on Map II
	Depth, base	Thickness, Feet.	Depth, base	Thickness, Feet.	Depth, base	Thickness, Feet.	Depth, base	Thickness, Feet.	Depth, base	Thickness, Feet.		
850B	276.3	2.5									336.4	1
805B												2
1190B												3
1600L											605.3	4
1020B			76.7	3.0	674.3	1.9	896.8	0.7			906.0	5
1010B					284.4	0.5					580.2	5A
1330B					375.4	1.5	528.5	2.5			590.2	5B
1085B			98.4	3.8							103.0	6
1250B			117.2	3.3							245.1	7
1200B	101.6	0.7	320.5	3.0							227.0	8
1085B	155.4	2.2	330.7	2.8		0		0		0	758.1	9
1325B						0					343.7	10
1715B						0						11
1870B			22.0	4.0							82.0	12
1075L												13
1395B												14
1330B												15
1330B												16
1265B											202.8	17
1225B											297.2	18
1245B												19
1105B												20
1400B											100.3	21
1330B					399.5		490.4	0.6	545.7	0.2	589.7	22
1475B					241.0	1.0	369.5	0.5			614.0	23
2105B												24
2530B							261.3	1.3				25
2125B												26
2600B												27
2190L												28
2590B												29
2580B												30
2315B												31
2325B												32
2045B												33
1725B							76.1	11.1			78.0	34
1697L							145.3	3.5			149.4	35
1675B							196.1	2.4			439.2	36
1660B												37
1800L							111.4	4.5	369.2		640.0	38
2162L												39
2715B												40
2210B												41
1950B												42
2055B												43
2225B												44
2400B												45
2290B												46
2740B												47
2420B							82.3	4.3				48
2510B												49
2375B												50
2435B												51
2090B												52
1600B												53
1965B												54
1950B												55
1930B									263	0	368	56

the coal resources of Nicholas, have been bored in contiguous territory. An attempt was made to secure the records of all of these 58 borings for publication but owing to the inability or unwillingness of some of the operators who made them only part of them have been obtained. The following table, while lacking in some of the details that it should contain, gives the surface elevations and ownership of all the borings, and the condensed records of such as were secured. The first column gives the key number on Map II, by which the position of the borings may be found and in the elevation column the letter "L" signifies a hand-level determination, and "B" indicates that the aneroid barometer was used, checked on the nearest government elevation. The following abbreviations of Company names have been used:

B. & O. R. R.....	Baltimore and Ohio Railroad Company.
Elk River C. & L....	Elk River Coal and Lumber Company.
Enterprise.....	Enterprise Coal Company.
Gauley C. L.....	Gauley Coal Land Company.
Hartland.....	Hartland Colliery Company.
Lackawanna.....	Lackawanna Coal and Lumber Company.
Laing Mining.....	Laing Mining Company.
Lewis C. & L.....	Lewis Coal and Land Company.
Nuttall Hrs.....	Nuttall Heirs.
Tioga Lumber.....	Tioga Lumber Company.
W. Va. C. & C.....	West Virginia Coal & Coke Company.

DETAILED COAL TEST RECORDS, JEFFERSON DISTRICT.

Within the limits of Jefferson District four tests have been bored for coal. In contiguous territory three other tests have been made that have bearing on the district. The following is the record of a hole in the edge of Kanawha County, the same having been published by C. E. Krebs in the Kanawha Report of the Survey, pages 571-572, and later by Ray V. Hennen in the Fayette Report, pages 389-390, certain revisions being made in which the writer concurs:

John Q. Dickinson No. 2 Coal Test Boring (1).

Cabin Creek District, Kanawha County, on Bells Creek, 2½ miles southeast of Pond Gap, and one-half mile northwest from the common corner of Clay, Fayette, Kanawha, and Nicholas Counties; authority, C. E. Krebs; elevation, 850' B.

	Thickness.		Total.	
	Ft.	In.	Ft.	In.
Surface	22	3	22	3
Shale	4	0	26	3
Sandstone	9	0	35	3
Sandy shale.....	10	4	45	7
Fire clay.....	0	8	46	3
Coal and bone..0' 3" } Little Chilton	1	0	47	3
Shale .....0 3 }				
Coal and bone..0 6 }	0	6	47	9
Fire clay.....				
Sandy shale.....	1	7	49	4
Sandstone	26	10	76	2
Sandy shale.....	5	0	81	2
Coal and bone.0' 7" } Hernshaw.....	3	1	84	3
Coal .....0 9 }				
Coal and bone.0 2 }				
Coal .....0 7 }				
Sandstone ....0 1 }	3	0	87	3
Coal .....0 11 }				
Sandy shale.....	4	1	91	4
Sandstone	0	3	91	7
Green shale.....	14	0	105	7
Sandstone	1	9	107	4
Sandy shale.....	0	2	107	6
Coal and bone.....	0	5	107	11
Shale with coal streaks.....	2	0	109	11
Fire clay.....	21	0	130	11
Sandy shale	5	3	136	2
Sandstone	4	7	140	9
Sandy shale.....	0	6	141	3
Bone and coal..0' 3" } Williamson...	24	4	165	7
Coal .....0 3 }				
Sandy shale.....	1	3	166	10
Slate				

	Thickness.		Total.	
	Ft.	In.	Ft.	In.
Shale	0	3	167	1
Coal, Cedar Grove "Rider".....	0	2	167	3
Fire clay.....	2	0	169	3
Sandy shale.....	11	9	181	0
Sandstone	8	4	189	4
Sandy shale.....	10	0	199	4
Sandstone, Peerless.....	57	7	256	11
Sandy shale.....	16	10	273	9
Coal .....1' 8" } Campbell Creek	2	6	276	3
Fire clay.....0 8 } (Peerless				
Coal and bone..0 2 } Bench)				
Sandy shale.....	20	8	296	11
Coal, Campbell Creek (No. 2 Gas Bench)	2	6	299	5
Fire clay.....	2	10	302	3
Sandy shale.....	5	2	307	5
Sandstone	6	0	313	5
Sandy shale.....	3	2	316	7
Coal and bone, Powellton "A".....	1	0	317	7
Sandy shale.....	14	3	331	10
Coal .....1' 0" }	2	7	334	5
Fire clay.....0 8 } Powellton....				
Coal .....0 11 }				
Fire clay.....				
	2	0	336	5

The records of the Lackawanna Coal and Lumber Company Boring (2), made by C. C. Sharp on the south side of Twentymile Creek, at the southeast edge of Vaughan, and the Lackawanna Coal and Lumber Company No. 1 (3) Boring, located in Pleasant District, Clay County, at the head of Road Fork of Twentymile, 0.8 mile northwest of Vaughan, were not obtained.

The following important record, revealing almost the entire Allegheny Series, as well as the upper portion of the Kanawha Group, having been previously published in the Braxton and Clay Report of the Survey, pages 479-481, is that of a boring located in the edge of Clay County, 0.8 mile from the Nicholas Line, the correlations being made by Ray V. Hennen, whose remarks concerning it follow the record:

Hartland Colliery Company No. 2 Coal Test Record (4).

Pleasant District, Clay County, on ridge between Sycamore and Middle Creeks, 1.5 miles due south of Rosetta School and 3.9 miles northeast of Greendale; authority, Hartland Colliery Company; elevation, 1600' L.

	Thickness.		Total.										
	Ft.	In.	Ft.	In.									
Surface	6	0	6	0									
Sandstone, rotten, yellow and brown 5' 8"	}		}										
Sandstone, gray and brown						8	8	Lower Freeport	48	8			
Sandstone and pea conglomerate coarse						20	11						
Shale and pea con- glomerate						1	6						
Shale, black, and sandstone						4	3						
Sandstone, grayish- white						7	8						
Shale, black, and sandstone.....						4	5				59	1	
Coal, bone streak near top, Upper Kittanning						1	2				60	3	60' 3"
Sandstone, pebbly, coarse, and grayish- white						42'	7"				}		
Sandstone and shale..						5	3						
Sandstone, grayish- white	19	5											
Shale, sandy, trace of coal 9" above bottom	6	11	Upper East Lynn	122	5								
Shale and sandstone mixed	13	4											
Shale	6	2											
Sandstone, fine.....	4	0											
Sandstone, medium- grained to coarse, gray to grayish-white at bottom.....	24	9											
Coal	1'	2"				}	}						
Shale and coal.	0	10							Middle Kittanning...	2				5
Coal	0	5											
Shale, sandy.....	12	11				185	1	124' 10"					
Sandstone, medium- grained, gray.....	44'	3"				}							
Sandstone, with a little pea conglomerate, top grayish-white	11	3	East Lynn	72	5								
Sandstone	16	11											
Coal, shaly and bony, No. 5	1	2				271	7	86' 6"					
Shale, sandy.....	2	0	273	7									
Sandstone, grayish-white, medium- grained	7	10	281	5									
Shale	3	0	284	5									
Coal, No. 5 Block, Lower Bench....	1	11	286	4	14' 9"								
Shale, bluish-gray.....	7	0	293	4									
Sandstone, medium-grained, gray...	5	11	299	3									
Shale, dark-gray.....	14	3	313	6									
Sandstone, medium-grained, grayish- white, Homewood.....	38	1	351	7									

	Thickness.	Total.		
	Ft. In.	Ft. In.		
Coal1' 2" } Stockton "A"	1 5½	353 0½	66' 8½"	
Coal and slate 0 3½ } }				
Sandstone and shale	6 0½	359 1		
Shale, black	4 0	363 1		
Slate, black, siliceous, marine fossils, Kanawha Black Flint	2 2	365 3		
Coal, Stockton	0 10	366 1	13' 0½"	
Shale, sandy	4 10	370 11		
Sandstone, fine-grained, gray	6 1	377 0		
Sandstone and shale	10 0	387 0		
Shale, slaty, soft, bluish-gray	14 5	401 5		
Sandstone, grayish-white, medium- grained	16 4	417 9		
Shale, slaty, bluish-black	4 11	422 8		
Sandstone, coarse-grained, white	2 6	425 2		
Coal1' 10" } Coalburg	5 1	430 3	64' 2"	
Shale, soft, little streaks of coal1 7 }				
Coal1 8 }				
Slate, soft, dark-gray	1 4	431 7		
Sandstone and slate	12 1	443 8		
Coal	0 3	443 11		
Shale, bluish-black	2 0	445 11		
Sandstone and shale	1 11	447 10		
Coal	0 6	448 4		
Sandstone and shale	8 5	456 9		
Coal	0 1	456 10		
Sandstone and shale	2 8	459 6		
Coal	0 9	460 3		
Sandstone and shale	7 8	467 11		
Sandstone, medium-coarse, grayish- white	23 1	491 0		
Shale, bluish-black	1 7	492 7		
Coal, Winifrede	1 6	494 1	63' 10"	
Sandstone and shale	11 0	505 1		
Coal1' 11" } Lower Shale, little streaks } Winifrede	6 11	512 0	17' 11"	
of coal5 0 }				
Shale and sandstone	3 1	515 1		
Sandstone, medium-grained, grayish- white, with one or two coal streaks	73 11	589 0		
Slate, bluish-black, streaks of sand- stone	11 1	600 1		
Fire clay and shales	2 9	602 10		
Shale, sandy, to bottom of hole	2 6	605 4	93' 4"	

"The above boring was visited by the writer in December, 1916, the core carefully examined, and the horizon of its well-mouth determined to be about 15 feet below the base of the conglomeratic Upper Freeport Sandstone which forms a conspicuous bluff and strews the ground with large boulders just west of the boring."

The following deep test record, correlated mainly by the writer, is that of a very important boring completed after field

work was finished in the county, its location and elevation, as well as the record itself, being furnished by Clark & Krebs, of Charleston, W. Va., the cores having been examined by Mr. C. E. Krebs. Besides indicating the absence of commercial coals in the New River Group in this locality, the record shows the further interesting fact that most of the heavy sandstones of that group, as well as of the Lower Kanawha, still retain much of their massive character, although this region is far north of their best development:

Lewis Coal & Land Company No. 1 Coal Test Record (5).

Jefferson District, on Twentymile Creek at the mouth of Board-tree Branch, 3 miles southwest of Harriet; authority, Lewis Coal & Land Company through Clark & Krebs, of Charleston, W. Va.; completed, May 1, 1918; elevation, 1013' B.

	Thickness.		Total.	
	Ft.	In.	Ft.	In.
Surface	13	5	13	5
Sandstone	0	10	14	3
Shale	4	0	18	3
Sandstone	5	7	23	10
Shale	1	8	25	6
Coal, Powellton "A".....	0	6	26	0
Shale	23	5	49	5
Coal and bone.....0' 3" } Powellton	1	4	50	9
Coal .....1 1 }				
Fire clay.....	0	6	51	3
Sandstone, Eagle.....	22	6	73	9
Coal and bone.....0' 6" } Eagle...	3	0	76	9
Coal .....2 6 }				
Sandstone .....5' 7" }				
Sandstone, streaked } Decota..	28	3	105	0
with slate .....22 8 }				
Slate	9	3	114	3
Sandstone	1	6	115	9
Slate	10	5	126	2
Shale	2	4	128	6
Slate	6	6	135	0
Coal, Little Eagle.....	0	9	135	9
Fire clay.....	0	6	136	3
Sandstone, Grapevine.....	56	9	193	0
Slate	9	7	202	7
Sandstone, hard and shaly.....	2	10	205	5
Sandstone, hard.....	9	10	215	3
Slate .....24' 1" } Eagle Shale	26	4	241	7
Shale .....2 3 }				
Shale, sandy.....	1	11	243	6
Sandstone, hard..44' 5" } Upper				
Sandstone .....18 0 } Gilbert	62	5	305	11
Slate	4	2	310	1

	Thickness.	Total.
	Ft. In.	Ft. In.
Shale	0 6	310 7
Sandstone, hard. 5' 10" } Lower		
Slate 7 8 } Gilbert....	29 3	339 10
Sandstone, hard. 15 9 }		
Slate	0 4	340 2
Bone 0' 6" }		
Slate 0 9 } Gilbert..	1 10	342 0
Coal and bone..... 0 7 }		
Shale	2 7	344 7
Shale, sandy.....	14 2	358 9
Sandstone 18' 2" } Dotson.	48 8	407 5
Sandstone, hard.... 30 6 }		
Shale, hard and dark.....	8 11	416 4
Sandstone, hard.....	7 5	423 9
Shale, dark and sandy.....	17 10	441 7
Sandstone, Dotson.....	11 11	453 6
Slate	0 6	454 0
Coal, Douglas.....	2 3	456 3
Slate	0 9	457 0
Shale	6 10	463 10
Shale, dark.....	14 3	478 1
Slate	3 3	481 4
Sandstone	6 6	487 10
Slate	3 0	490 10
Shale	2 6	493 4
Sandstone, hard.... 4' 8" }		
Sandstone, crystal-		
lized 8 11 } Upper		
Shale, hard and dark 0 5 } Nuttall..	74 3	567 7
Sandstone, crystal-		
lized 58 11 }		
Sandstone, hard.... 1 4 }		
Shale, hard and dark.....	0 8	568 3
Sandstone, hard.....	1 2	569 5
Shale, hard and dark.....	0 8	570 1
Sandstone, hard.....	8 10	578 11
Sandstone, hard, and shale, mixed..	11 8	590 7
Slate	2 8	593 3
Shale	12 5	605 8
Slate, streaked with coal, laeger "B".	8 3	613 11
Sandstone, streaked		
with shale..... 7' 3" } Lower		
Sandstone, hard.... 4 11 } Nuttall	21 7	635 6
Sandstone, crystal-		
lized 9 5 }		
Shale, dark and sandy.....	11 6	647 0
Shale, dark, Upper laeger.....	20 2	667 2
Sandstone	5 2	672 4
Coal 0' 10" }		
Bone 0 2 } Hughes Ferry	1 11	674 3
Coal 0 11 }		
Fire clay, brown.....	2 4	676 7
Sandstone, hard.....	6 3	682 10
Slate	8 3	691 1
Fire clay, brown.....	4 3	695 4

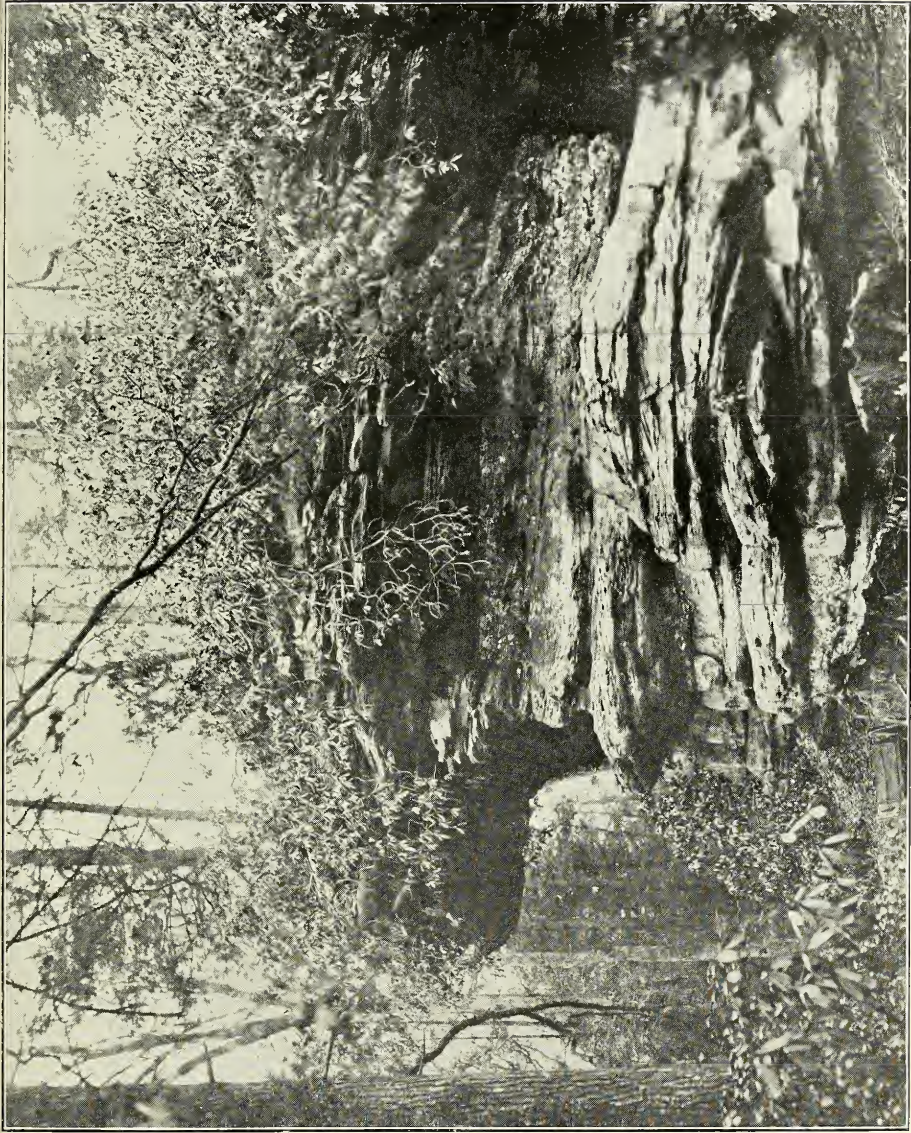


PLATE XVIII. — Lower Nuttall Sandstone along highway south of Jerry Fork of Hominy Creek and 2.1 miles southeast of Mt. Nebo. Photo by E. E. Harris.

	Thickness.		Total.	
	Ft.	In.	Ft.	In.
Sandstone	13	5	708	9
Shale, dark.....	3	8	712	5
Shale, sandy.....	1	6	713	11
Shale, dark.....	5	7	719	6
Sandstone	0	8	720	2
Slate	4	9	724	11
Fire clay.....	2	7	727	6
Sandstone	3	9	731	3
Shale, dark.....	3	2	734	5
Sandstone ...26' 11" } Middle laeger..	30	7	765	0
Sandstone ... 3 8 }				
Slate, black.....	8	0	773	0
Shale, brown.....	5	0	778	0
Coal, Lower laeger.....	0	8	778	8
Shale, brown.....	4	0	782	8
Sandstone	1	6	784	2
Shale, brown.....	1	2	785	4
Sandstone	1	5	786	9
Slate, soft.....	5	6	792	3
Slate, bone and coal...0' 8" } Castle	1	0	793	3
Coal .....0 4 }				
Fire clay.....	1	3	794	6
Sandy shale.....	6	1	800	7
Sandstone, Guyandot, and shale....	12	0	812	7
Slate	7	8	820	3
Shale	1	4	821	7
Shale, sandy.....	6	9	828	4
Slate	7	7	835	11
Coal and bone....0' 3" }				
Shale .....0 3 }	0	10	836	9
Coal .....0 4 }				
Fire clay.....	2	6	839	3
Shale	1	7	840	10
Slate	5	6	846	4
Shale, reddish-brown.....	3	6	849	10
Shale	11	11	861	9
Shale and sandstone.....	8	4	870	1
Slate	5	4	875	5
Coal and bone, Sewell "A".....	0	2	875	7
Shale	2	0	877	7
Sandstone, Lower Guyandot.....	14	1	891	8
Slate, black, Hartridge.....	4	6	896	2
Coal and slate, Sewell.....	0	8	896	10
Slate	0	4	897	2
Fire clay.....	2	7	899	9
Shale, brown, sandy.....	4	11	904	8
Sandstone, hard, to bottom.....	1	4	906	0

The two following records, correlated mainly by the writer, are those of tests made subsequent to the completion of field work, the records, locations, and elevations being furnished the Survey by Clark & Krebs, of Charleston, W. Va. The logs furnish important information on the underground

measures in the southern end of Jefferson District:

J. Q. Dickinson No. 1 Coal Test Record (5A).

Jefferson District, on Laurel Creek, 2.2 miles southeastward from Swiss; authority, J. Q. Dickinson through Clark & Krebs of Charleston, W. Va.; elevation, 1010' B.; completed, August 22, 1919.

	Thickness.		Total.
	Ft.	In.	
Surface	3	1	3 1
Sandrock, hard, Lower Dotson	18	8	21 9
Slate	4	8	26 5
Sandrock, crystallized.43' 11" } Sandrock, hard.....12 2 } Sandrock, hard, with shale spots..... 3 8 } Sandrock, crystallized. 7 6 } Sandrock, hard.....21 4 } Upper Sandrock, crystallized.14 1 } Nut- Sandrock, hard.....10 8 } tall Sandrock, crystallized.24 0 } Conglomerate rock.... 2 0 } Sandrock, hard, and shale mixed.....34 0 }	173	4	199 9
Shale, dark, sandy.....	2	7	202 4
Slate	2	6	204 10
Shale	2	0	206 10
Shale, sandy.....	17	2	224 0
Slate, streaked with coal, laeger "B"	8	7	232 7
Slate	4	3	236 10
Shale	2	3	239 1
Sandrock, hard.....20' 0" } Sandrock and shale, mixed 1 4 } Lower Sandrock, crystallized.. 0 9 } Nut- Sandrock, hard, streaked } tall with shale..... 3 6 }	25	7	264 8
Shale, dark.....	16	10	281 6
Slate	2	11	284 5
Coal and bone, Hughes Ferry	0	6	284 11
Slate	3	3	288 2
Sandrock, hard.....	3	4	291 6
Shale, hard.....	5	4	296 10
Shale, hard, dark, streaked with sandrock	31	6	328 4
Slate	6	8	335 0
Shale, dark.....	5	0	340 0
Shale, dark, and sandrock.....	8	8	348 8
Sandrock	1	11	350 7
Shale, dark, and sandrock.....	11	7	362 2
Slate	5	10	368 0
Sandrock.....	1	0	369 0
Shale, dark, and sandrock.....	5	8	374 8
Sandrock	0	11	375 7

	Thickness.		Total.	
	Ft.	In.	Ft.	In.
Shale, dark.....	0	7	376	2
Sandrock	3	6	379	8
Sandrock, hard.....	3	2	382	10
Shale	0	3	383	1
Sandrock, crystallized.....	6	0	389	1
Shale, dark.....	2	6	391	7
Shale, dark, with crystallized sand- rock streaks.....	18	7	410	2
Sandrock, crystallized. 2' 9")				
Sandrock, hard, gray.. 5 0)				
Sandrock, crystallized. 26 11)				
Shale, dark..... 2 4)				
Sandrock, crystallized. 1 8)				
Slate 3 6)				
Sandrock, crystallized. 1 8)				
Slate 4 1)				
Sandrock, crystallized. 0 6)				
Conglomerate rock... 1 5)				
Sandrock, crystallized. 27 6)				
Sandrock, hard, gray.. 1 4)				
Sandrock, crystallized. 1 6)				
Shale, dark.....	1	0	491	4
Conglomerate rock.... 0' 10")				
Crystallized sandrock. 1 10)				
Conglomerate rock... 1 0)				
Shale, dark..... 0 10)				
Sandrock, crystallized. 1 9)				
Conglomerate rock.... 2 10)				
Sandrock, crystallized. 2 7)				
Shale, dark, with conglomerate streaks	3	0	506	0
Shale, dark, Sewell Coal horizon....	2	0	508	0
Shale and sandrock.....	6	2	514	2
Sandrock, hard, gray.....	12	0	526	2
Shale, sandy.....	3	9	529	11
Slate	0	3	530	2
Shale	7	3	537	5
Slate, with coal streaks.....	0	5	537	10
Fire clay.....	2	10	540	8
Shale	1	9	542	5
Shale, reddish-brown.....	2	6	544	11
Shale, light.....	3	7	548	6
Shale, dark.....	3	10	552	4
Sandrock	0	3	552	7
Coal, Welch.....	0	1	552	8
Fire clay, dark.....	2	7	555	3
Sandrock, Upper Raleigh.....	22	2	577	5
Shale	0	3	577	8
Slate, with coal streaks.....	0	3	577	11
Fire clay.....	2	3	580	2

J. Q. Dickinson No. 2 Coal Test Record (5B).

Jefferson District, on Laurel Creek, 3.2 miles eastward from Swiss; authority, J. Q. Dickinson through Clark & Krebs of Charleston, W. Va.; elevation, 1330' B.; completed, September, 1919.

	Thickness.		Total.
	Ft.	In.	Ft. In.
Surface	22	2	22 2
Sandrock	2	0	24 2
Coal .....0' 2"	} Gilbert..	0 7	24 9
Slate .....0 2			
Coal .....0 3			
Slate, streaked with coal.....	0	6	25 3
Slate	0	9	26 0
Fire clay.....	2	9	28 9
Slate and coal.....	0	3	29 0
Shale	5	8	34 8
Sandrock .....10' 8"	} Dotson.	31 7	66 3
Sandrock streaked with shale.....18 0			
Sandrock 2 11			
Slate	3	9	70 0
Shale	1	0	71 0
Sandrock, hard.... 4' 0"	} Lower Dotson.	122 1	193 1
Sandrock, crystallized...109 3			
Conglomerate rock 8 10			
Coal and bone, Lower Douglas.....	0	6	193 7
Fire clay.....	0	4	193 11
Shale, dark.....	12	8	206 7
Sandrock, hard.... 1' 9"	} Upper Nuttall	81 10	288 5
Shale 0 7			
Sandrock, hard.... 1 10			
Slate 0 3			
Sandrock, hard.... 2 0			
Shale 0 5			
Sandrock, hard....14 7			
Coal 0 8			
Fire clay..... 2 0			
Sandrock, hard.... 9 8			
Sandrock, crystallized.... 7 11			
Sandrock, crystal- lized, with shale streak... 8 0			
Shale, dark, with s a n d r o c k streak .....17 3			
Slate 4 10			
Shale, sandy..... 3 0			
Sandrock, hard.... 7 1			
Shale, dark, sandy.....	2	10	291 3
Slate, streaked with coal... 1' 0"	} laeger "B"	1 5	292 8
Coal 0 5			
Slate, streaked with coal.....	4	2	296 10

	Thickness. Ft. In.	Total. Ft. In.
Sandrock, hard, and shale, mixed.... 5' 6"	} Lower Nuttall	78 0 374 10
Sandrock, hard.... 1 2		
Sandrock, crystallized... 20 5		
Shale, dark, streaked with sandrock 5 8		
Shale, dark..... 24 3		
Sandrock, crystallized... 3 6		
Shale, dark, hard.. 2 6		
Sandrock, hard.... 8 9		
Shale, hard, streaked with crystallized sandrock. 6 3		
Slate .....			0 7	375 5
Coal, Hughes Ferry.....	1 8	377 1
Slate, streaked with coal.....	0 11	378 0
Shale	6 0	384 0
Slate	1 5	385 5
Shale	2 5	387 10
Sandrock	1 3	389 1
Shale, hard, dark.....	2 2	391 3
Sandrock, hard.....	1 4	392 7
Shale, hard, dark.....	3 8	396 3
Slate	2 8	398 11
Coal, Castle.....	0 2	399 1
Shale	4 2	403 3
Sandrock, hard. 4' 3"	} Guyandot.	58 6 461 9
Sandrock, crystallized. 54 3		
Shale, dark.....	4 6	466 3
Sandrock, crystallized... 34' 11"	} Lower Guyandot	54 3 520 6
Conglomerate rock. 1 8		
Sandrock, crystallized... 12 8		
Shale, dark, sandy.....	7 10	528 4
Sandrock, crystallized.....	0 2	528 6
Coal, Sewell	2 6	531 0
Shale, hard, dark.....	0 8	531 8
Fire clay, brown, and shale, mixed..	6 3	537 11
Sandrock, crystallized. 7' 9"	} Welch	19 11 557 10
Shale, dark, and hard sandrock, mixed... 12 2		
Slate	29 10	587 8
Coal, Welch	0 11	588 7
Shale, dark-brown, and fire clay, mixed.....	1 8	590 3

DETAILED COAL TEST RECORDS, GRANT DISTRICT.

In Grant District four holes have been bored for coal, and in addition to these another has been made in Henry District, Clay County, not far from the Nicholas County Line, and therefore has a bearing on the district. The three following records are those of borings made subsequent to the completion of field work in the county, their locations and elevations being furnished by Clark & Krebs, of Charleston, W. Va., the correlations being mainly by the writer. Being located in a region in which the Eagle Coal lies under drainage, they reveal the presence of this coal in commercial thickness, thereby adding an important contribution to the geologic knowledge of Grant District:

Lewis Coal & Land Company No. 2 Coal Test Record (6).

Grant District, on Robinson Fork, 0.2 mile above its junction with Twentymile Creek, and 1.6 miles southwest of Harriet; authority, Lewis Coal & Land Company, through Clark & Krebs, of Charleston, W. Va.; elevation, 1085' B.; completed, May 10, 1918.

	Thickness.		Total.
	Ft.	In.	
Surface	15	0	15 0
Shale, sandy.....	6	9	21 9
Slate	0	3	22 0
Fire clay.....	3	0	25 0
Shale, sandy.....	9	6	34 6
Coal, Powellton.....	0	8	35 2
Sandrock, Eagle.....	43	2	78 4
Slate	0	4	78 8
Fire clay.....	1	3	79 11
Shale	13'	7"	Newlon. 14 8
Slate	1	1	
Coal	3'	8"	Eagle.. 3 10
Coal and bone.....	0	2	
Fire clay.....	0	3	98 8
Shale	4	4	103 0

Lewis Coal & Land Company No. 3 Coal Test Record (7).

Grant District, at the mouth of Panther Branch of Robinson Fork of Twentymile Creek, 1.2 miles south of Harriet; authority, Lewis Coal & Land Company, through Clark & Krebs, of Charleston, W. Va.; completed, May 24, 1918; elevation, 1250' B.

	Thickness.		Total.
	Ft.	In.	
Surface	4	4	4 4
Fire clay.....	2	8	7 0

	Thickness.	Total.
	Ft. In.	Ft. In.
Sandstone .....14' 3"	} Brownstown 34 4	41 4
Shale 3 7		
Sandstone .....16 6		
Shale	5 4	46 8
Slate	0 4	47 0
Sandstone	0 6	47 6
Shale	10 2	57 8
Coal, Powellton.....	1 4	59 0
Fire clay	3 0	62 0
Shale	2 5	64 5
Sandstone	23 7	88 0
Shale, sandy	6 2	94 2
Bone .....0' 2"	} Eagle "A" 0 11	95 1
Coal 0 6		
Bone 0 3		
Fire clay.....	1 6	96 7
Slate	0 8	97 3
Sandstone, Eagle	3 10	101 1
Slate 5' 6"	} Newlon ... 12 9	113 10
Slate 0 4		
Shale 3 9		
Slate, soft, black. 3 2		
Coal, Eagle.....	3 4	117 2
Fire clay and shale.....	2 5	119 7
Sandstone, Decota.....	22 0	141 7
Shale	1 1	142 8
Slate	3 8	146 4
Coal, Little Eagle.....	2 10	149 2
Slate	0 2	149 4
Sandstone, streaked ...11' 6"	} Grapevine.. 23 6	172 10
Sandstone 2 0		
Shale and sand- stone, mixed..10 0		
Shale, dark.....5' 11"	} Eagle Shale 43 9	216 7
Slate 9 3		
Sandstone 1 2		
Slate .....27 5		
Sandstone, Upper Gilbert	28 6	245 1

Lewis Coal & Land Company No. 4 Coal Test Record (8).

Grant District, on Twentymile Creek, 1.4 miles northwest of Harriet; authority, Lewis Coal & Land Company, through Clark & Krebs, of Charleston, W. Va.; completed, July 4, 1918; elevation, 1200' B.

	Thickness.	Total.
	Ft. In.	Ft. In.
Surface	12 4	12 4
Slate	6 3	18 7
Shale, sandy	16 0	34 7
Sandstone	44 5	79 0
Coal	0 3	79 3
Shale	21 3	100 6

	Thickness.		Total.	
	Ft.	In.		Ft.	In.
Slate	0	5	100	11
Coal, Campbell Creek (Peerless Bench)	0	8	101	7
Fire clay	3	6	105	1
Shale	12	0	117	1
Slate	1	3	118	4
Coal, Campbell Creek (No. 2 Gas Bench)	2	3	120	7
Shale	14	1	134	8
Slate	1	3	135	11
Shale	4	4	140	3
Sandstone, streaked, Brownstown..	44	8	184	11
Slate	12	2	197	1
Sandstone, Eagle.....	20	1	217	2
Slate	0	4	217	6
Coal, core lost..... 0' 6" }				
Coal 2 6 } Eagle .	3	0	220	6
Fire clay	1	1	221	7
Sandstone to bottom.....	5	5	227	0

The record of the **Elk River Coal and Lumber Company No. 1 (9) Boring**, located in Henry District, Clay County, at the mouth of Beech Fork of Lilly Fork of Buffalo Creek, 3.5 miles northeastward from Harriet, is published in connection with the section for Beech Fork of Lilly, pages 132-4.

The record of the **B. Frank Grose No. 1 (10) Boring**, located at the mouth of Hutchinson Branch of Peters Creek, 0.4 mile northeast of Gilboa, is published in connection with the section for Gilboa, pages 123-4.

DETAILED COAL TEST RECORDS, SUMMERSVILLE DISTRICT.

In Summersville District no borings have been made for coal, the only information on the underground seams being that contained in the records of several tests for oil and gas, the same being published in Chapter IX.

DETAILED COAL TEST RECORDS, HAMILTON DISTRICT.

In Hamilton District ten holes have been bored for coal, besides three others located in adjacent territory in Clay and Webster Counties, and therefore having a bearing on the district.

The record of the **Jacob Smith No. 1 (11) Boring**, located on Persinger Creek, 1.3 miles southwest of Persinger village, was not obtained.

The following is the record of a churn drill hole, the washings from which were inspected in part by Dr. Price and the writer:

David Pletcher No. 1 Coal Test Record (12).

Hamilton District, on McMillion Creek, 2.1 miles southeast of Hookersville; authority, Herold and Porter; completed, August 20, 1917; elevation, 1870' B.

	Thickness.		Total.
	Ft.	In.	Ft. In.
Surface	18	0	18 0
Coal and shale, Eagle.....	4	0	22 0
Blue rock (sandstone).....	40	0	62 0
Coal, Little Eagle.....	1	2	63 2
Sandstone, coarse.....	14	10	78 0
Coal, (reported by driller)	1' 0"		} Lower War .. 4 0 82 0 Eagle
Coal	2	4	
Slate	0	4	
Coal	0	4	
Fire clay and slate to bottom.....	2	0	84 0

The record of the Elk River Coal & Lumber Company No. 2 (13) Boring, located in Buffalo District, Clay County, on Buffalo Creek, 1.2 miles southwest of Widen and the same distance from the Nicholas County Line, was not obtained.

The following is the reported record of a hole bored in Clay County, the same having been published by Ray V. Hennen in the Braxton and Clay Report of the Survey, page 474. Mr. Hennen's remarks concerning the source of the record and the stratigraphic associations follow:

W. W. Murphy No. 1 Coal Test Record (14).

Buffalo District, Clay County, 1.8 miles northward from Widen and 0.6 mile due south of Wattsville; drilled by Perkins and Emmart; authority, Walker Wilson; elevation, 1395' B.

	Thickness	Depth
	Feet.	Feet.
Coal, Lower Kittanning (No. 5 Block).....	9	184
Coal, Clarion.....	3.5	227.5
Coal, Stockton.....	5	300.5

"The Survey was unable to obtain the detailed log of the above boring, the results published being figures that were given the writer by Walker Wilson, residing in the immediate region, as the latter overheard the driller reporting the same on the telephone. It starts 135 feet below the top of the outcropping Upper Freeport Sandstone cliff,

as determined by the writer, and the interval at Widen between the top of the latter member and the base of the No. 5 Block Coal bed is about 330 feet, a result that corroborates the presence of the latter seam in the above boring at a depth of 185 to 190 feet. Hence, it is very probable that the record as published is in close harmony with the facts, any partings, of course, that each seam might have contained being included in the total thickness of the bed."

The records of the **Perry Wilson Heirs No. 1 (15) Boring**, located on Right Fork of Strange Creek, 0.4 mile north of Wattsville, and the **Perry Wilson Heirs No. 2 (16) Boring**, located on the same stream, 0.5 mile north of Wattsville, were not obtained, the same being churn drill holes by Perkins and Emmart.

The following record, previously published by Ray V. Hennen in the Braxton and Clay Report of the Survey, page 469, is that of a churn drill hole on the same tract. Mr. Hennen's remarks concerning it follow the record:

Perry Wilson Heirs No. 3 Coal Test Record (17).

Hamilton District, on Right Fork of Strange Creek, 0.5 mile north of Wattsville; drilled by Perkins and Emmart; authority, C. E. Krebs, of Charleston, W. Va.; elevation, 1265' B.

	Thickness.		Total.	
	Ft.	In.		Ft.	In.
Surface	21	0	21	0
Sandstone	1	9	22	9
Dark slate and wash, No. 5 Block				
Coal horizon?.....	3	9	26	6
Fire clay, Lower Kittanning	2	11	29	5
Sandstone, gray. 64' 11" }				
Dark sandstone. 20 8 } Homewood	94	9	124	2
Light sandstone. 9 2 }				
Coal, Stockton "A"	0	9	124	11
Sandstone	10	3	135	2
Sandstone, with coal streaks, Stockton	14	6	149	8
Shale	1	1	150	9
Sandstone, with coal streaks.....	31	3	182	0
Sandstone, with shale streaks.....	11	11	193	11
Sandy shale to bottom.....	8	11	202	10

"The above boring, examined by Gawthrop, starts about 80 feet below the horizon of the Upper Kittanning Coal bed."

The following record, previously published by Ray V. Hennen in the Braxton and Clay Report of the Survey, pages

467-468, is that of a diamond drill hole in the same locality. Mr. Hennen's remarks follow the record:

Lewis Boggs Coal Test Record (18).

Hamilton District, on a branch of Right Fork of Strange Creek, 0.8 mile north of Wattsville; drilled by Perkins and Emmart; authority, C. E. Krebs, of Charleston, W. Va.; elevation, 1225' B.

	Thickness.		Total.				
	Ft.	In.	Ft.	In.			
Surface (probably holds No. 5 Block Coal)	27	0	27	0			
Shale	4	5	31	5			
Sandstone	23	4	54	9			
Sandy shale	10	3	65	0			
Slate	1	0	66	0			
Fire clay, Clarion?	10	1	76	1			
Slate	0	2	76	3			
Sandstone	1	1	77	4			
Sandy shale	1	6	78	10			
Black slate	1	9	80	7	80' 7"		
Sandstone, Homewood	43	8	124	3			
Sandstone, full of shale streaks	2	5	126	8			
Sandstone	0	6	127	2			
Laminated coal and bone	1	11"	3	11	131	1	50' 6"
Fire clay	0	5					
Laminated coal and bone	0	7					
Coal	0	3					
Laminated coal and bone	0	9					
Sandstone, Upper Coalburg, with coal streaks	53	9	184	10			
Shale, sandstone streaks	0	10	185	8			
Sandstone	6	7	192	3			
Dark sandstone, shale streaks	1	5	193	8			
Sandstone	25	2'	43	0	236	8	
Sandstone, coal streaks	17	10					
Fire clay, coal streaks	1	0					
Coal	0	3"	5	8	243	4	112' 3"
Sandstone	0	6					
Fire clay, sand stone streaks	1	8					
Sandstone, coal streaks	1	7					
Coal	0	6					
Black slate with laminated coal	0	6					
Coal	0	5					
Coal and bone	0	3					

	Thickness.		Total.		
	Ft.	In.	Ft.	In.	
Dark sandy shale.....	1	1	244	5	
Sandstone, coal streaks.....	10	0	254	5	
Sandy shale.....	2	4	256	9	
Black slate.....	1	0	257	9	
Fire clay.....	1	0	258	9	
Sandy shale.....	1	4	260	1	
Sandstone	4	0	264	1	
Shale with sandstone streaks.....	24	8	288	9	
Coal	0	5	} Chilton.	1	46' 9"
Fire clay.....	0	2			
Coal	0	1			
Bone	0	1			
Coal	0	5			
Bone	0	2			
Fire clay.....	2	2	292	3	
Sandstone to bottom.....	5	0	297	3	7' 2"

"The above boring, examined by Gawthrop, starts about 100 feet below the horizon of the Upper Kittanning Coal bed."

The **A. E. Henderson No. 1 (19) Boring**, made by the Enterprise Coal Company, on Lick Run of Strange Creek, 0.6 mile northeast of Dille, starts 15 feet below the Lower Kittanning (No. 5 Block) Coal, its record not having been secured.

The **Enterprise Coal Company Boring (20)**, drilled by the same corporation on Birch River, 2 miles northwest of Birch River village, starts flush with the Stockton Coal, its record not having been secured.

Tioga Lumber Company No. 1 Coal Test Record (21).

Hamilton District, on Anthony Creek at the mouth of Rich Fork, 3.8 miles northwest of Tioga; authority, Tioga Lumber Company; completed, September 24, 1907; elevation, 1400' B.

	Thickness.		Total.	
	Ft.	In.	Ft.	In.
Surface	4	0	4	0
Slate, streaked with sandstone.....	34	0	38	0
Fire clay.....	4	0	42	0
Sandstone	3	0	45	0
Sand slate.....	11	0	56	0
Coal, Lower War Eagle.....	0	1	56	1
Fire clay.....	2	8	58	9
Slate, dark.....	29	3	88	0
Fire clay.....	3	6	91	6
Sand shale, to bottom.....	8	10	100	4

The record of the **Tioga Lumber Company No. 2 (22) Boring**, drilled by that corporation on Anthony Creek, 0.4 mile below the mouth of Rich Fork and 4.2 miles northwest of Tioga, is published in connection with the Rich Fork of Anthony Creek Section, pages 144-6.

The following is the record of an important boring in the edge of Webster County:

Tioga Lumber Company No. 3 Coal Test Record (23).

Glade District, Webster County, on Birch River, 1.5 miles northwest of Boggs; authority, Tioga Lumber Company; completed, March 31, 1917; elevation, 1475' B.

	Thickness.		Total.	
	Ft.	In.	Ft.	In.
Surface	10	3	10	3
Shale, gray	2	7	12	10
Sandstone, Decota	30	4	43	2
Shale, gray	4	10	48	0
Sandstone	4	6	52	6
Coal, Little Cedar	0	6	53	0
Fire clay.....	0	2	53	2
Sandstone, Lower War Eagle	3	0	56	2
Coal, Lower War Eagle	0	10	57	0
Fire clay, impure.....	2	0	59	0
Shale, gray	9	0	68	0
Sandstone, Lower Gilbert	40	0	108	0
Coal, Gilbert	0	11	108	11
Shale, dark	5	1	114	0
Sandstone, Dotson	11	6	125	6
Shale, dark, sandy streaks.....	2	0	127	6
Shale, dark.....	44	2	171	8
Shale, gray.....	16	0	187	8
Sandstone, Lower Dotson	25	4	213	0
Bony (coal?) Lower Douglas	0	2	213	2
Fire clay.....	2	0	215	2
Slate, gray.....	5	10	221	0
Slate, black, soft.....	0	10	221	10
Shale, dark.....	4	2	226	0
Sandstone and gray shale, Lower Nuttall	10	0	236	0
Shale, dark.....	4	0	240	0
Slate, and coal, Hughes Ferry	1	0	241	0
Fire clay, impure.....	2	0	243	0
Shales, gray.....	37	2	280	2
Sandstone, Harvey	12	9	292	11
Shale, dark, Castle Coal horizon	1	6	294	5
Sandstone	3	3	297	8
Shale, dark.....	3	2	300	10
Shale, gray.....	14	0	314	10

Sandstone	9	2	324	0
Shale, dark.....	4	8	328	8
Sandstone and gray shale	2'	8"	} Guyandot	14
Sandstone	11	8			4	343
Coal, Sewell "B".....	0	10	343	10
Fire clay.....	12	0	355	10
Shale, dark.....	13	2	369	0
Coal, Sewell.....	0	6	369	6
Fire clay.....	2	0	371	6
Shale, gray.....	5	0	376	6
Shale, dark.....	6	9	383	3
Fire clay.....	2	9	386	0
Shale, dark.....	9	6	395	6
Coal, Welch.....	0	4	395	10
Fire clay.....	7	0	402	10
Shale, dark.....	3	4	406	2
Fire clay.....	3	0	409	2
Shale, white.....	7	8	416	10
Slate, gray.....	7	6	424	4
Shale, dark.....	3	2	427	6
Fire clay.....	7	1	424	7
Sandstone, Upper Raleigh (Sharon).....	33	10	468	5
Shale, sandy, gray (base of Pottsville).....	4	0	472	5
Shale, green.....	2	0	474	5
Shale, dark.....	13	0	487	5
Sandstone, hard.....	11	4	498	9
Shale, dark.....	2	0	500	9
Sandstone	10	0	510	9
Sandstone and shale.....	16	0	526	9
Sandstone	10	6	537	3
Shale, green, very sandy.....	2	8	539	11
Sandstone	9	4	549	3
Shale, gray.....	53	5	602	8
Shale, black, and bony, Pluto Coal horizon	0	4	603	0
Shale, gray.....	6	0	609	0
Shale, green.....	5	0	614	0

DETAILED COAL TEST RECORDS, BEAVER DISTRICT.

In Beaver District the only test made for coal is the A. J. Pettigrew No. 1 (24) Boring, drilled by G. W. Boggs on Beaver Creek, just south of Beaver village, its record not having been secured.

DETAILED COAL TEST RECORDS, RICHWOOD DISTRICT.

In Richwood District no tests have been bored for coal, as the base of the Pottsville is exposed along Cherry River, making it possible to drift directly into the seams.

DETAILED COAL TEST RECORDS, KENTUCKY DISTRICT.

In Kentucky District 25 holes had been bored for coal, when field work was completed in that vicinity (about November 1, 1917), and others have doubtless been made since that time of which the writer has no knowledge, as core drills were then in operation. Most unfortunately only a few of the records of these holes have been received from the owners.

The **Gauley Coal Land Company Boring (25)**, located on Mill Branch of Cherry River, 1.6 miles south of Holcomb, showed 1' 3" of Sewell Coal, according to Mr. F. C. Baker, General Land Agent of the West Virginia Coal and Coke Company.

The records of **Borings Nos. 26 to 33**, inclusive, the locations of which are shown on Map II, were not obtained.

The two following records were furnished the Survey by Mr. John B. Laing, of the Laing Mining Company:

Gauley Coal Land Company No. 10 Coal Test Record (34).

Kentucky District, on the south side of Gauley River, 1.3 miles above Beaver Creek and 1.3 miles north of Donald; authority, Laing Mining Company; elevation, 1725' B.

	Thickness.		Total.	
	Ft.	In.	Ft.	In.
Surface	18	0	18	0
Shale, gray.....	44	6	62	6
Slate, black, Hartridge	2	6	65	0
Coal .....1' 6" } Sewell.....	11	1	76	1
Slate .....2 2				
Coal .....6 1				
Coal, bony.....1 4				
Fire clay, dark, to bottom.....	1	11	78	0

Gauley Coal Land Company No. 9 Coal Test (35).

On the south side of Gauley River at the mouth of Seng Camp Run, 1.8 miles northwest of Donald; authority, Laing Mining Company; elevation, 1697' L.

	Thickness.		Total.	
	Ft.	In.	Ft.	In.
Sand and boulders.....	11	0	11	0
Sandstone, hard, Harvey	27	0	38	0
Slate, dark.....	10	0	48	0
Coal, Castle	1	5	49	5
Fire clay.....	8	6	57	11
Shale, dark.....	19	2	77	1

	Thickness.		Total.	
	Ft. In.		Ft. In.	
Sandstone, Guyandot	45	6	122	7
Shale, dark.....	4	0	126	7
Sandstone	1	0	127	7
Shale, gray.....	13	5	141	0
Slate, black, Hartridge	0	10	141	10
Coal .....0' 9" } Sewell				
Slate .....0 3½ } (1552' L.)..	3	6½	145	4½
Coal .....2 6 }				
Fire clay, impure.....	4	0½	149	5

The record of the **J. B. Jones No. 1 (36) Boring**, located on the south side of Gauley River, 0.3 mile above Persinger Ford, is published in connection with the Persinger Ford (South) Section, pages 165-6.

The record of the **Gauley Coal Land Company Boring (37)**, located at the ford of Hominy Creek, 1.8 miles north-east of Mt. Nebo, was not obtained.

The record of the **Gauley Coal Land Company Boring (38)**, located on Deer Creek, at Deepwell, is published in connection with the section for Fury Knob, pages 170-1.

The records of **Borings Nos. 39 to 47, inclusive**, the locations of which are shown on Map II, all being on the property of the Gauley Coal Land Company, were not obtained.

Gauley Coal Land Company Coal Test (48).

Kentucky District, on a branch of Grassy Creek, 0.8 mile northeast of Leivasy; authority, West Virginia Coal and Coke Company; elevation, 2420' B.

	Thickness.*		Total.	
	Ft. In.		Ft. In.	
Cover	78	0	78	0
Coal .....3' 9" } Sewell	4	4	82	4
Bony parting.....0 1 }				
Coal .....0 6 }				

The record of the **Gauley Coal Land Company No. 8 (49) Boring**, drilled by the West Virginia Coal and Coke Company on a branch of Grassy Creek, 2.9 miles northeast of Leivasy, was not obtained.

DETAILED COAL TEST RECORDS, WILDERNESS DISTRICT.

In Wilderness District three holes have been bored for



PLATE XIX. — Falls of Grassy Creek over Lower Guyandot Sandstone one mile north of Leivasy.
Photo by E. E. Harris.

coal, and four others have been made in adjacent territory in Fayette and Greenbrier Counties. The records of **Borings Nos. 50 to 52**, inclusive, the locations of which are shown on Map II, all drilled by the Gauley Coal Land Company on its own property, were not obtained. **Borings Nos. 53 to 55**, inclusive, the locations of which are shown on Map II, all of which were drilled by the Nuttall Heirs on their own property in Nuttall District, Fayette County, were not obtained.

The record of the **Mrs. E. T. Martin Boring (56)**, drilled by the Nutter Heirs in Meadow Bluff District, Greenbrier County, opposite Russellville, is published in connection with the section for Russellville, pages 180-1.

MINABLE COALS OF THE ALLEGHENY SERIES.

LOWER FREEPORT COAL.

The Lower Freeport Coal, previously discussed in Chapter V, page 195, apparently has minable thickness over a restricted region in the northeastern portion of the county. When compared with the Lower Kittanning (No. 5 Block), Eagle, Scwell and other coals of more extensive distribution and better quality, however, the Lower Freeport belongs rather in the class of reserve fuel, available for mining at some future date. In that portion of Hamilton District, west of Tioga, where it is best developed, it is from two to five feet in thickness, with some small streaks of bone, the coal being partly soft and gaseous and partly splinty. The only chemical analyses available show it to be rather high in ash but low in sulphur, and it would seem probable that it could be coked if desired. Figure 5 shows its probable minable area. Its outcrop is shown on Map II in the region of its supposed commercial occurrence. Detailed prospects and exposures are recorded on the following pages:

Lower Freeport Coal, Hamilton District.

In Hamilton District the Lower Freeport Coal has been prospected at several points west of Tioga on the waters of Muddlety, Beaver, and Anthony Creeks, revealing a fair thickness. The following openings were noted:

Coal Blossom—No. 9 on Map II.

In ridge road, head of Slabcamp Run of Birch River, 0.7 mile north of Morris P. O.; **Lower Freeport Coal**; elevation, 1465' B.
Coal blossom, thickness unknown.

Coal Exposure—No. 10 on Map II.

On Powell Mountain, in road, 1.4 miles northeast of Hookersville; **Lower Freeport Coal**; elevation, 2398' L.; for stratigraphic position and details see Hookersville Section, page 148.

Coal Blossom—No. 11 on Map II.

On west side of Clear Fork of Muddlety Creek, 3.0 miles N. 43° E. of Opal; **Lower Freeport Coal**; elevation, 2328' L.; observation by Price.
Coal blossom, thickness unknown.

Kinney-Hawkins Estate Prospect—No. 12 on Map II.

On west side of Clear Fork of Muddlety Creek, 3.9 miles west of Tioga; **Lower Freeport Coal**; elevation, 2315' B.; observation by Price.

	Ft.	In.
Shale		
Bone	0	4
Coal, splinty	0' 10 "	
Coal, soft.....	0 6	
Bone	0 1	
Coal, soft.....	0 7½	2 0½
<hr style="width: 20%; margin: 0 auto;"/>		
Shale, concealed in water.....		

Coal Prospect—No. 13 on Map II.

On head of Collins Fork of Muddlety Creek 2.7 miles northwest of Tioga; **Lower Freeport Coal**; elevation, 2345' L.; observation by Price.

	Ft.	In.
Sandstone, shaly		
Coal, bony splint	1' 6"	
Coal, soft	1 1	2 7
<hr style="width: 20%; margin: 0 auto;"/>		
Shale, soft, pavement.....		

Tioga Lumber Company Prospect—No. 14 on Map II.

On east side of Bearpen Fork of Beaver Creek, 2.3 miles S. 87° W. of Tioga; **Lower Freeport Coal**; elevation, 2360' L.; observation by Price.

	Ft.	In.
Shale		
Coal, pyrite streak in upper 2'.....	5'	1"
Coal, concealed in water.....	1	0
	<hr style="width: 50px; margin-left: auto; margin-right: 0;"/>	6 1

Tioga Lumber Company Prospect—No. 15 on Map II.

On east side of Bearpen Fork of Beaver Creek, 2.2 miles N. 85° W. of Tioga; **Lower Freeport Coal**; elevation, 2385' B.; observation by Price.

	Ft.	In.
Shale, black		
Coal, visible	2'	0"
Coal, concealed by water.....	2	0
	<hr style="width: 50px; margin-left: auto; margin-right: 0;"/>	4 0

Tioga Lumber Company Prospect—No. 16 on Map II.

On head of Lower Laurel Run of Beaver Creek, 1.8 miles northwest of Tioga; **Lower Freeport Coal**; elevation, 2348' L.; observation by Price.

	Ft.	In.
1. Shale		
2. Bone	0	2
3. Coal, medium-hard	1'	6"
4. Coal, hard, splint	0	7
5. Coal, medium-hard	2	3
	<hr style="width: 50px; margin-left: auto; margin-right: 0;"/>	4 4
6. Shale		

The analysis of a sample of this coal, cut from Nos. 3, 4 and 5 of section made for the Tioga Lumber Company by the Fuel Testing Company, of Boston, Massachusetts, is published in the Tioga Lumber Company Table of Coal Analyses at the end of this Chapter.

Tioga Lumber Company Exposure—No. 17 on Map II.

On south side of Upper Laurel Run of Beaver Creek, 1.5 miles northwest of Tioga; **Lower Freeport Coal**; elevation, 2330' L.; observation by Price.

Coal, in run, thickness unknown.

Tioga Lumber Company Prospect—No. 18 on Map II.

On head of Road Fork of Anthony Creek, 2.1 miles northwest of Tioga; Lower Freeport Coal; elevation, 2321' L.; observation by Price.

	Ft.	In.
1. Shale		
2. Coal, soft	0'	8"
3. Coal, hard, splint	2	0
4. Coal, soft	0	8
5. Coal, hard, splint	0	8
	4	6
6. Shale, pavement.....		

A sample (No. 10P) was collected from Nos. 2, 3, 4, and 5 of section, the composition of which is published under **Mine No. 18** in the Survey Table of Coal Analyses at the end of this Chapter.

A sample cut from the same members and analyzed by the Fuel Testing Company of Boston, Massachusetts, is published in the Tioga Lumber Company Table of Coal Analyses at the end of this Chapter.

A composite sample from three prospects that apparently included Lower Freeport Coal from Prospects Nos. 16 and 18 on Map II and Upper Kittanning Coal from Prospect No. 40 on Map II, is reported as follows by the same authority:

"Ash, 11.01 per cent.; B. T. U., 13,241; fusing temperature of ash, 2800° F."

Quantity of Lower Freeport Coal Available.

The following table, compiled by Tucker, from a close estimate of the acreage of minable coal indicated on Figure 5, shows the probable amount of Lower Freeport Coal in the county:

Probable Amount of Lower Freeport Coal.

District	Thickness of Coal Assumed. Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Hamilton	3	12.00	7680	1,003,622,400	40,144,896

UPPER KITTANNING COAL

The Upper Kittanning Coal, previously discussed in Chapter V, page 197, and shown by outcrop lines on Map II in that portion of the county where its horizon occurs, is found in many of the high ridges of the northern and northwestern portions of the county, exhibiting minable thickness at most points. It is usually, though not always, multiple-bedded, and generally hard and splinty, although gaseous layers frequently occur, its thickness varying from 2 to 5 feet. It has been mined at numerous points for local domestic consumption and has been used to a limited extent for fuel on logging railroads. As shown by the Table of Coal Analyses at the end of this Chapter, it is a high volatile coal of great excellence and purity and will undoubtedly furnish a large tonnage of commercial fuel. Figure 6 shows its areal extent.

Upper Kittanning Coal, Jefferson District.

In Jefferson District the Upper Kittanning Coal crops in the high ridges along the northwestern border, mainly north of Twentymile Creek, but has been seldom prospected, owing to the Coalburg and other seams being more readily available at lower horizons. The following is the only opening noted:

Harrison Jones Farm Mine—No. 19 on Map II.

On south hillside of Spring Branch of Rockcamp Creek, 1.3 miles N. 82° W. of Vaughan; **Upper Kittanning Coal**; elevation, 1545' B.

	Ft.	In.
Slate, dark		
Coal, splinty	3	0
Slate, pavement		

Upper Kittanning Coal, Grant District.

In Grant District the Upper Kittanning Coal crops in the high ridges along the northern border, mainly north of Twentymile Creek next to the Clay County Line. Owing to the presence of the Coalburg and others coals at lower horizons, as well as to the wooded nature of this region, it has apparently not been prospected in the district but it is believed that a search for it in the ridges would reveal it in commercial quantity.

Upper Kittanning Coal, Summersville District.

In Summersville District the Upper Kittanning Coal crops along the northern edge, mainly north of Twentymile Creek, next to the Clay County Line. It has been prospected at only a few points, the following openings having been noted:

J. D. Acre Farm Mine—No. 20 on Map II.

1.6 miles northwest of Dade; **Upper Kittanning Coal**; elevation, 1780' B.

	Ft.	In.
Soil		

		Ft.	In.
Coal	0' 6"		
Slate, black, 0' 1" to.....	0 2		
Coal, medium-hard	2 4	3	0
<hr style="width: 10%; margin-left: auto; margin-right: 0;"/>			
Slate, pavement.....			

J. D. Acre Farm Mine—No. 21 on Map II.

On the head of Hickory Fork of Buffalo Creek, 1.4 miles north-west of Dade; **Upper Kittanning Coal**; elevation, 1790' B. Fallen shut, thickness unknown.

A sample (No. 270R) was collected from a stock pile on the dump, the composition of which is published under **Mine No. 21** in the Survey Table of Coal Analyses at the end of this Chapter. According to local report this coal burns well, leaving only a small amount of white ash and no cinders.

E. V. Woods Prospect—No. 22 on Map II.

On hill south of Libertybowl Branch of Beech Fork of Lilly Fork of Buffalo Creek, at Dade; **Upper Kittanning Coal**; elevation, 1905' B.

	Ft.	In.
Coal, reported in spring	1	6

John Dalton Farm Mine—No. 23 on Map II.

On hillside north of Beech Fork of Lilly Fork of Buffalo Creek, 0.6 mile south of Dade; **Upper Kittanning Coal**; elevation, 1960' B.

		Ft.	In.
Coal	1' 0"		
Shale, gray	0 4		
Coal	0 4		
Shale, gray.....	0 3		
Coal	0 6		
Shale, gray	0 5		
Coal	0 7	3	4
<hr style="width: 10%; margin-left: auto; margin-right: 0;"/>			
Slate, pavement			

Upper Kittanning Coal, Hamilton District.

In Hamilton District the Upper Kittanning Coal has been prospected at numerous points, mainly on the waters of Elk and Birch Rivers and Beaver Creek, the following openings having been noted:

Coal Blossom—No. 24 on Map II.

On hill west of Right Fork of Strange Creek, 0.4 mile N. 21° W. of Wattsville; **Upper Kittanning Coal**; elevation, 1335' B.

Coal blossom, reported, thickness unknown.

Coal Blossom—No. 25 on Map II.

In road, north of Road Fork of Strange Creek, 1.5 miles S. 58° W. of Birch River; **Upper Kittanning Coal**; elevation, 1610' B.

Coal blossom, thickness unknown.

M. N. Hoover Farm Mine—No. 26 on Map II.

On hillside south of Mill Creek, 1.8 miles N. 57° E. of Birch River; **Upper Kittanning Coal**; elevation, 1735' B.; observation by Price.

	Ft.	In.
Fallen shut, coal, reported.....	2	0

Coal Exposure—No. 27 on Map II.

On hillside north of Mill Creek, 3.2 miles N. 45° E. of Birch River; **Upper Kittanning Coal**; elevation, 1695' B.; observation by Price.

Coal, in spring, thickness unknown.

Martin V. Dodrill Farm Mine—No. 28 on Map II.

On north side of Birch River 1.4 miles northwest of Skyles; **Upper Kittanning Coal**; elevation, 1930' B.

	Ft.	In.
1. Shale, sandy.....		
2. Coal	0'	8"
3. Slate, gray.....	0	1
4. Coal	0	7
5. Slate, black.....	0	2
6. Coal	1	5
7. Shale, gray.....	0	4
8. Coal, splint	2	9
9. Slate, pavement, and concealed.....	6	0

A sample (No. 331R) was collected from Nos. 2, 4, 6, and 8 of section, the composition of which is published under **Mine No. 28** in the Survey Table of Coal Analyses at the end of this Chapter.

John Perine Farm Mine—No. 29 on Map II.

In ridge at head of Rose Run of Birch River, 1.3 miles southwest

of Skyles; **Upper Kittanning Coal**; elevation, 2055' B.; observation by Reger and Price.

	Ft.	In.
Sandstone, massive, coarse, soft, Lower Freeport		
Slate, black		
Coal, hard.....	1'	0"
Slate, bony.....	0	5
Coal, medium-soft.....	1	10
Slate, gray.....	0	1
Coal	0	6
	<hr style="width: 50px; margin-left: auto; margin-right: 0;"/>	3 10
Slate, pavement.....		

Tioga Lumber Company Prospect—No. 30 on Map II.

On hillside south of Cabin Run of Anthony Creek, 4.2 miles N. 65° W. of Tioga; **Upper Kittanning Coal**; elevation, 2120' B.

	Ft.	In.
Sandstone, massive, Lower Freeport		
Slate, dark.....	0	5
Coal, soft.....	0'	7"
Coal, splint.....	1	10
Coal, soft.....	1	3
	<hr style="width: 50px; margin-left: auto; margin-right: 0;"/>	3 8
Slate, pavement.....		

Tioga Lumber Company Prospect—No. 31 on Map II.

On hillside west of Anthony Creek, 3.6 miles N. 58° W. of Tioga; **Upper Kittanning Coal**; elevation, 2140' B.

	Ft.	In.
1. Sandstone, massive, Lower Freeport		
2. Coal, soft.....	0'	3"
3. Coal, splint.....	1	10
4. Coal, soft.....	1	2
	<hr style="width: 50px; margin-left: auto; margin-right: 0;"/>	3 3
5. Slate, pavement.....		

A sample (No. 330R) was collected from Nos. 2, 3, and 4 of section, the composition of which is published under **Mine No. 31** in the Survey Table of Coal Analyses at the end of this Chapter.

Tioga Lumber Company Prospect—No. 32 on Map II.

On hillside north of Road Fork of Anthony Creek, 2.5 miles N. 55° W. of Tioga; **Upper Kittanning Coal**; elevation, 2185' B.

Fallen shut, thickness unknown.

Tioga Lumber Company Prospect—No. 33 on Map II.

On hillside west of an east branch of Poplar Creek, 2.4 miles north of Tioga; **Upper Kittanning Coal**; elevation, 2330' B.

Fallen shut, thickness unknown.

Coal Prospect—No. 34 on Map II.

At north end of ridge between Shant Branch and Powell Creek, 2.8 miles southwest of Birch River; **Upper Kittanning Coal**; elevation, 1910' B.; for stratigraphic position, see Shant Branch Section, page 141.

	Ft.	In.
Fallen shut, reported by D. W. George 3' 0" to.....	4	0

Coal Blossom—No. 35 on Map II.

In road at south end of Powell Mountain, 1¾ miles northeast of Hookersville; **Upper Kittanning Coal**; elevation, 2305' B.; for stratigraphic position, see Hookersville Section, page 148.

Coal blossom, thickness unknown.

L. H. Corran Farm Mine—No. 36 on Map II.

On Corran Knob south of Lower Spruce Run of Brushy Fork of Muddlety Creek, 1 mile northwest of Hookersville; **Upper Kittanning Coal**; elevation, 2270' B.; investigation by Reger and Price.

	Ft.	In.
1. Slate, black.....		
2. Coal, splint.....	4	0
3. Slate, pavement.....		

A sample (No. 3P) was collected from No. 2 of section by Dr. Price, the composition of which is published under **Mine No. 36** in the Survey Table of Coal Analyses at the end of this Chapter.

G. M. Rapp Farm Mine—No. 37 on Map II.

On Corran Knob north of Paddy Run of Muddlety Creek, 0.7 mile northwest of Hookersville; **Upper Kittanning Coal**; elevation, 2300' B.; investigation by Reger and Price.

	Ft.	In.
Shale, gray.....		
Coal.....	0'	5"
Slate, black.....	0	5
Coal, splinty.....	3	11
Slate, pavement.....		

Coal Exposure—No. 38 on Map II.

Exposed in an east branch of Clear Fork of Muddlety Creek, 2.7 miles N. 55° E. of Opal; **Upper Kittanning Coal**; elevation, 2302' L.; observation by Price.

	Ft.	In.
Coal, in run.....	2	0

Tioga Lumber Company Prospect—No. 39 on Map II.

On hillside south of Upper Laurel Run of Beaver Creek, 1.6 miles N. 68° W. of Tioga; **Upper Kittanning Coal**; elevation, 2300' B.; observation by Price.

Coal, (thin), amount unknown.

Tioga Lumber Company Mine—No. 40 on Map II.

On Upper Laurel Run of Beaver Creek, 1.7 miles N. 66° W. of Tioga; **Upper Kittanning Coal**; elevation, 2285' B.

	Ft.	In.
1. Sandstone		
2. Coal, splint.....	2'	5"
3. Niggerhead	0	2
4. Coal, splint.....	1	8
5. Slate, gray.....	0	2
6. Coal, splint.....	1	7
7. Slate, pavement.....		

A sample (No. 335R) was collected from Nos. 2, 4, and 6 of section, the composition of which is published under **Mine No. 40** in the Survey Table of Coal Analyses at the end of this Chapter. Coal from this mine was formerly used for railroad fuel and other purposes by the Tioga Lumber Company, but the operation has been abandoned.

A sample of this coal, of which 2" was rejected (probably No. 5 of section), is published under **Mine No. 40** in the Tioga Lumber Company Table of Coal Analyses at the end of this Chapter.

The inclusion of No. 3 of section in the above sample accounts for the high ash content as the Survey sample showed only 10.38 per cent.

**Tioga Lumber Company Prospect (Mollohan Mine)—
No. 41 on Map II.**

On a north fork of Upper Laurel Run of Beaver Creek, 1.5 miles northwest of Tioga; **Upper Kittanning Coal**; elevation, 2323' L.

	Ft.	In.
Coal , reported by Tioga Lumber Company.....	4	0

The above opening, which was not inspected by a member of the Survey but is reported from information supplied by the owners, apparently belongs at the Upper Kittanning horizon, judging by its elevation and position. A sample analyzed for the company is published under **Mine No. 41** in the Tioga Lumber Company Table of Coal Analyses at the end of this Chapter.

Upper Kittanning Coal, Beaver District.

In Beaver District the Upper Kittanning Coal is present in only a few of the ridges at the extreme northern edge, as the rapid southeastward rise of the rocks soon lifts its horizon above the hills. The following is the only Upper Kittanning prospect in the district of which the Survey has knowledge, the position, elevation, thickness, and chemical analyses of the same being reported by L. Harrison, President of the Tioga Lumber Company:

Tioga Lumber Company Prospect—No. 42 on Map II.

On Left Fork of Beaver Creek, 1.8 miles northwest of Delphi; **Upper Kittanning Coal**; elevation, 2341' L.; reported by Tioga Lumber Company.

	Ft.	In.
Coal , with $4\frac{3}{4}$ " of slate.....	4	$2\frac{1}{2}$

The analyses of two samples, the $4\frac{3}{4}$ " of slate being rejected from the first sample but not from the second, are published under **Mine No. 42** in the Tioga Lumber Company Table of Coal Analyses at the end of this Chapter.

It may be possible that the above prospect represents the Middle Kittanning Coal rather than the Upper Kittanning, as the structure contours would indicate that it is the former

seam, while the chemical analyses favor the latter, but whatever the proper correlation may be, the analyses reveal a valuable bed of coal.

Quantity of Upper Kittanning Coal Available.

The following table, compiled by Tucker from a planimetric measurement of the outcrop of the coal on Map II, shows the probable amount of Upper Kittanning Coal by Districts in the county:

Probable Amount of Upper Kittanning Coal.

District	Thickness of Coal Assumed. Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Jefferson	3	6.80	4,352	568,719,360	22,748,774
Grant	3	1.35	864	112,907,520	4,516,301
Summersville	3	6.55	4,192	547,810,560	21,912,423
Hamilton	3	56.30	36,032	4,708,661,760	188,346,470
Beaver	3	1.60	1,024	133,816,320	5,352,653
Totals		72.60	46,464	6,071,915,520	242,876,621

MIDDLE KITTANNING COAL.

The Middle Kittanning Coal, previously discussed in Chapter V, pages 198-9, is found in the high ridges of the northern and northwestern portions of the county, sufficient prospecting having been done to indicate that it is generally present in minable thickness where its horizon occurs, although it is doubtless absent or thin over small local areas. It is usually double- or multiple-bedded, quite splinty and often high in ash, and owing to the latter impurity would seem to be best suited for domestic fuel or for the manufacture of producer gas, and it is hard enough to stand shipment well and is high in volatile matter. Its thickness varies from 2 to 5 feet. Its outcrop is not shown on Map II, but its position is normally about midway between the Upper Kittanning and

Lower Kittanning (No. 5 Block) Coals, and its place in the hills may be determined from the outcrops of the latter two seams. Its interval from the Lower Kittanning (No. 5 Block) Coal varies, however, from a few feet to 60 or 70 feet, owing to the frequent disappearance of the lenticular Upper East Lynn Sandstone which belongs between them, and its interval of 50 to 70 feet below the Upper Kittanning will therefore be found a more dependable guide. Figure 7 shows its areal extent.

Middle Kittanning Coal, Jefferson District.

In Jefferson District the Middle Kittanning Coal apparently has not been prospected, owing to the fact that the Lower Kittanning (No. 5 Block), Coalburg, and other lower coals are more readily available. It should be present principally in the ridges north of Twentymile Creek, and when this wooded area is fully explored it will doubtless prove to be of minable thickness.

The following opening, located in Fayette County, one-half mile from the Jefferson District Line, illustrates its character in this region, the details of the prospect having been published by Ray V. Hennen in the Fayette Report of the Survey, page 460:

W. L. Chapman Coal Opening—No. 43 on Map II.

On hillside east of House Branch of Bells Creek, Falls District, Fayette County; Middle Kittanning Coal; elevation, 1470' B.; observation by D. D. Teets, Jr.

		Ft.	In.
Coal, splint (sandstone roof)	2' 1"		
Bone	0 5		
Coal	0 9		
Slate	0 1		
Coal, (slate floor)	1 2	4	6

Middle Kittanning Coal, Grant District.

In Grant District the Middle Kittanning Coal crops in the high hills along Twentymile Creek, but south of that region soon overshoots the ridges. So far as known it has not been prospected in the district, owing to the presence of other coals more readily accessible, as well as to the wooded nature of the country. It is believed that a search would reveal it over most of the Twentymile drainage. The following is the only exposure noted:

Coal Blossom—No. 43A on Map II.

Along hill road north of Twentymile Creek and 0.6 mile northwest of Harriet; **Middle Kittanning Coal**; elevation, 1645' B.; for stratigraphic position, see Harriet (North) Section, page 120.

Coal blossom, thickness unknown.

Middle Kittanning Coal, Summersville District.

In Summersville District the Middle Kittanning Coal crops in the high ridges along the head of Twentymile Creek, and on the waters of Buffalo Creek, and in a limited area on the west side of Muddlety Creek, almost the entire region of its outcrop being virgin or cut-over forest, little prospecting having been done for this coal. The following openings and exposures were noted:

Coal Prospect—No. 44 on Map II.

On hill west of Muddlety Creek, 1.5 miles S. 30° W. of Fockler School, and 2.7 miles S. 16° W. of Muddlety village; **Middle Kittanning Coal**; elevation, 2380' B.

Fallen shut, thickness unknown.

Coal Blossom—No. 45 on Map II.

Along ridge road, between Beech Fork of Lilly Fork and Robinson Fork of Buffalo Creek, 1.3 miles southeast of Dade; **Middle Kittanning Coal**; elevation, 1905' B.

Coal blossom, thickness unknown.

Middle Kittanning Coal, Hamilton District.

In Hamilton District the Middle Kittanning Coal crops in the ridges along the waters of Buffalo Creek, Strange Creek, Birch River, Muddlety and Beaver Creeks, being found generally in the northern two-thirds of the district. Numerous openings have been made and at several points the coal has been mined for local domestic fuel, the development work already done being sufficient to justify the statement that it is apparently of minable thickness at nearly all points where its horizon occurs.

Coal Blossom—No. 46 on Map II.

On hillside east of Robinson Fork of Buffalo Creek, 3.2 miles S. 80° E. of Enoch; **Middle Kittanning Coal**; elevation, 1565' B.; for stratigraphic position, see Isom Branch Section, page 135.

Coal blossom, thickness unknown.

Coal Blossom—No. 47 on Map II.

On hillside west of Right Fork of Strange Creek, 0.4 mile N. 19° W. of Wattsville; **Middle Kittanning Coal**; elevation, 1210' B.

Coal streak, reported.

Coal Blossom—No. 48 on Map II.

On hillside north of Lick Run of Strange Creek, 0.6 mile N. 19° E. of Dille; **Middle Kittanning Coal**; elevation, 1300' B.

Coal blossom, thickness unknown.

Coal Blossom—No. 49 on Map II.

In road along hillside east of Road Fork of Strange Creek, 1.2 miles S. 26° E. of Dille; **Middle Kittanning Coal**; elevation, 1475' B.

Coal blossom, thickness unknown.

Coal Prospect—No. 50 on Map II.

On hillside east of Shant Branch of Powell Creek, 2.7 miles S. 26° E. of Birch River; **Middle Kittanning Coal**; elevation, 1765' B.; for stratigraphic position and details, see Shant Branch Section, page 141.

C. W. Brown Prospect—No. 51 on Map II.

On hillside south of Mill Creek, 1.6 miles N. 58° E. of Birch River; **Middle Kittanning Coal**; elevation, 1675' B.; observation by Price.

	Ft.	In.
Coal , clean, reported.....	1	10

Tioga Lumber Company Prospect—No. 52 on Map II.

On Mudlick Run of Anthony Creek, 0.6 mile N. 55° E. of Anthony School and 2.4 miles S. 50° E. of Birch River; **Middle Kittanning Coal**; elevation, 1910' B.; for stratigraphic position and details, see Mudlick Run of Anthony Section, page 143.

Tioga Lumber Company Coal Blossom—No. 53 on Map II.

On Rockhouse Run of Anthony Creek, 3.5 miles west of Tioga; **Middle Kittanning Coal**; elevation, 2228' L.; observation by Price. Coal, in spring, thickness unknown.

Tioga Lumber Company Prospect—No. 54 on Map II.

On Road Fork of Anthony Creek, 2.1 miles N. 75° W. of Tioga; **Middle Kittanning Coal**; elevation, 2230' L.; observation by Price. Fallen shut, thickness unknown.

Tioga Lumber Company Prospect—No. 55 on Map II.

On hillside south of Redoak Branch of Poplar Creek, 2.8 miles S. 80° W. of Boggs; **Middle Kittanning Coal**; elevation, 1990' B. Fallen shut, thickness unknown.

Tioga Lumber Company Coal Blossom—No. 56 on Map II.

On hillside east of Pantherlick Branch of Poplar Creek, 2.2 miles N. 40° W. of Tioga; **Middle Kittanning Coal**; elevation, 2060' B. Coal blossom, thickness unknown.

Tioga Lumber Company Prospect—No. 57 on Map II.

On hillside east of Pantherlick Branch of Poplar Creek, 1.8 miles N. 49° W. of Tioga; **Middle Kittanning Coal**; elevation, 2160' B. Fallen shut, thickness unknown.

Tioga Lumber Company Prospect (Margaret Strange Opening)—No. 58 on Map II.

On the head of a branch of Barnet Run of Birch River, 1.2 miles southwest of Boggs; **Middle Kittanning Coal**; elevation, 2202' B.

	Ft.	In.
1. Shale, sandy.....		
2. Coal, medium-soft.....	2'	7"
3. Coal, hard, bony splint.....	2	3
	4	10
4. Slate, concealed and slate to Lower Kittanning Coal	15	5

A sample (No. 244R) was collected from Nos. 2 and 3 of section, the composition of which is published under **Mine No. 58** in the Survey Table of Coal Analyses at the end of this Chapter.

Tioga Lumber Company Prospect—No. 59 on Map II.

On a short branch of Poplar Creek, 2.2 miles north of Tioga; **Middle Kittanning Coal**; elevation, 2225' B.
 Fallen shut, thickness unknown.

Tioga Lumber Company Prospect—No. 60 on Map II.

On hillside west of Poplar Creek, 1.6 miles N. 15° W. of Tioga; **Middle Kittanning Coal**; elevation, 2215' B.

	Ft.	In.
1. Slate, black.....		
2. Coal, splint..... 2' 5"		
3. Coal, splint, slightly bony..... 1 9	4	2
4. Slate, upavement.....		

A sample (No. 333R) was collected from Nos. 2 and 3 of section, the composition of which is published under **Mine No. 60** in the Survey Table of Coal Analyses at the end of this Chapter.

Tioga Lumber Company Prospect—No. 61 on Map II.

On hillside east of Poplar Creek, 1.5 miles N. 12° W. of Tioga; **Middle Kittanning Coal**; elevation, 2225' B.
 Fallen shut, thickness unknown.

J. H. Craig Farm Mine—No. 62 on Map II.

On hillside north of Muddlety Creek, 0.8 mile S. 30° W. of Hookersville; **Middle Kittanning Coal**; elevation, 2240' B.; observation by Price.

	Ft.	In.
Fallen shut, coal, reported.....	4	0

L. W. Herold Prospect—No. 63 on Map II.

On east side of Brushy Fork of Muddlety Creek, 0.8 mile N. 52° E. of Hookersville; **Middle Kittanning Coal**; elevation, 2260' B.
 Fallen shut, thickness unknown.

L. W. Herold Prospect—No. 64 on Map II.

On the head of Lower Spruce Run of Brushy Fork of Muddlety Creek, 1 mile N. 52° W. of Hookersville; Middle Kittanning Coal; elevation, 2185' B.

Fallen shut, thickness unknown.

McQueen Brothers Farm Mine—No. 65 on Map II.

In road on Powell Mountain, between Spruce Run and Brushy Fork of Muddlety Creek, 1.4 miles N. 23° E. of Hookersville; Middle Kittanning Coal; elevation, 2185' B.; for stratigraphic position see Hookersville Section, page 148.

	Ft.	In.
1. Slate, black.....		
2. Coal, splinty..... 2' 9"		
3. Coal, medium-soft..... 0 11	3	8
4. Slate, pavement.....		

A sample (No. 251R) was collected from Nos. 2 and 3 of section, the composition of which is published under **Mine No. 65** in the Survey Table of Coal Analyses at the end of this Chapter.

A section measured at another part of this mine is published in connection with the Section for Hookersville, page 148. This opening has often been regarded as the Lower Kittanning Coal, but the true Lower Kittanning has been prospected in the same hillside only a short distance westward, 65 feet lower in elevation, there being a westward structural dip of 15 to 20 feet between the two openings.

Andrew McCoy Farm Mine—No. 66 on Map II.

On hillside east of Brushy Fork of Muddlety Creek, 2.1 miles north-east of Hookersville; Middle Kittanning Coal; elevation, 2225' B.; observation by Price.

	Ft.	In.
Sandstone, with plant fossils.....		
Coal, soft, gas..... 0' 0½"		
Shale, soft..... 0 0½		
Coal, bony cannel..... 0 11		
Shale, soft..... 0 1		
Coal, cannel splint..... 2 9	3	10
Shale		

Wallace Hill Coal Blossom—No. 67 on Map II.

On hillside south of Muddlety Creek, 1.3 miles S. 85° E. of Hookersville; Middle Kittanning Coal; elevation, 2330' B.; observation by Price.

	Ft.	In.
Coal blossom.....	2	2½

Tioga Lumber Company Prospect—No. 68 on Map II.

On a short branch of Muddlety Creek, 2.5 miles N. 41° W. of Delphi; Middle Kittanning Coal; elevation, 2315' L.; observation by Price.

Fallen shut, thickness unknown.

Tioga Lumber Company Prospect—No. 69 on Map II.

On west side of Muddlety Creek, 3.3 miles southwest of Tioga; Middle Kittanning Coal; elevation, 2244' L.; reported by Tioga Lumber Company.

	Ft.	In.
Coal, reported.....	4	6

Tioga Lumber Company Prospect—No. 70 on Map II.

On hillside east of Muddlety Creek, 3.1 miles S. 71° W. of Tioga; Middle Kittanning Coal; elevation, 2290' B.; observation by Price.

	Ft.	In.
Shale		
Coal	0'	2"
Bone	0	5
Coal	0	4
	0	11
Shale		

Tioga Lumber Company Prospect—No. 71 on Map II.

On hillside east of Muddlety Creek, 2.6 miles N. 56° W. of Delphi; Middle Kittanning Coal; elevation, 2294' L.; observation by Price.

	Ft.	In.
Shale		
Bone and coal streaks.....	0'	9"
Coal, weathered.....	1	6
Shale	0	1
Coal	2	1
	4	5
Shale, concealed in water.....		

Tioga Lumber Company Prospect—No. 72 on Map II.

On Lower Laurel Run of Beaver Creek, 1.7 miles west of Tioga; Middle Kittanning Coal; elevation, 2271' L.; observation by Price.

	Ft.	In.
Shale		
Bone	0	3
Coal	2	0
Bone (niggerhead), and concealed.....		

Tioga Lumber Company Prospect—No. 73 on Map II.

On Upper Laurel Run of Beaver Creek, 1.2 miles N. 64° W. of Tioga; Middle Kittanning Coal; elevation, 2250' L.; observation by Price.

Fallen shut, thickness unknown.

Middle Kittanning Coal, Beaver District.

In Beaver District the Middle Kittanning Coal area is limited to a comparatively narrow strip along the northern edge, mainly on the waters of Beaver Creek. South of this region its horizon shoots above the hilltops. The following prospects and exposures were noted:

R. A. Curry Prospect—No. 74 on Map II.

On hillside west of Beaver Creek, 0.9 mile S. 41° W. of Delphi; Middle Kittanning Coal; elevation, 2460' B.

Fallen shut, thickness concealed.

T. J. Means Prospect—No. 75 on Map II.

On hillside west of Beaver Creek, 1.8 miles S. 60° W. of Delphi; Middle Kittanning Coal; elevation, 2491' L.; observation by Price.

Coal blossom, thickness unknown.

Edwin Baber Farm Mine—No. 76 on Map II.

On west side of Beaver Creek, 0.9 mile northwest of Delphi; Middle Kittanning Coal; elevation, 2320' B.

	Ft.	In.
Slate, dark		
Coal, bony	0'	5"
Coal, medium-hard	3	3
Coal, bony	0	7
	4	3
Slate, pavement, and concealed to Lower Kittanning		
Coal	39	0



PLATE XX. — Middle Kittanning Coal at McQueen Brothers Mine (No. 65 on Map II), near Hookersville; two-foot rule stands at base.

Photo by E. E. Harris.

Tioga Lumber Company Exposure—No. 77 on Map II.

Exposed in Lower Laurel Run of Beaver Creek, 1.3 miles N. 83° W. of Tioga; Middle Kittanning Coal; elevation, 2268' L.; observation by Price.

Coal, in run, thickness unknown.

Tioga Lumber Company Prospect—No. 78 on Map II.

On hillside west of Lower Laurel Run of Beaver Creek, 1.5 miles N. 86° W. of Tioga; Middle Kittanning Coal; elevation, 2277' L.; observation by Price.

	Ft.	In.
Shale, gray, soft		
Coal, weathered	1' 0 "	
Shale, weathered	0 4½	
Coal, visible, bottom concealed.....	0 10½	2 3

Tioga Lumber Company Prospect—No. 79 on Map II.

On hillside north of Walnut Fork of Beaver Creek, 0.3 mile N. 75° W. of Tioga; Middle Kittanning Coal; elevation 2326' L.

	Ft.	In.
1. Shale		
2. Bone and shale	0	8
3. Coal, soft	1' 11"	
4. Coal, medium-soft	2 0	3 11
5. Shale, pavement		

A sample (No. 9P) was collected from Nos. 3 and 4 of section, the composition of which is published under **Mine No. 79** in the Survey Table of Coal Analyses at the end of this Chapter.

Tioga Lumber Company Prospect—No. 80 on Map II.

On hillside west of Beaver Creek, 0.8 mile N. 82° W. of Tioga; Middle Kittanning Coal; elevation, 2287' L.
Fallen shut, thickness unknown.

Tioga Lumber Company Prospect—No. 81 on Map II.

In ravine on north side of Beaver Creek, 1.1 miles northward from Tioga; Middle Kittanning Coal; elevation, 2261' L.

		Ft.	In
Slate			
Coal	0' 6½"		
Bone	0 1½		
Coal, hard	2 0		
Bone	0 4		
Coal, hard	1 8	4	8
Slate, pavement			

Tioga Lumber Company Prospect—No. 82 on Map II.

On the south side of Beaver Creek, 0.8 mile north of Tioga; Middle Kittanning Coal; elevation, 2290' L. Fallen shut, thickness unknown.

Quantity of Middle Kittanning Coal Available.

The following table compiled by Tucker from a close estimate of the acreage, shows the probable amount of Middle Kittanning Coal by districts in the county:

Probable Amount of Middle Kittanning Coal.

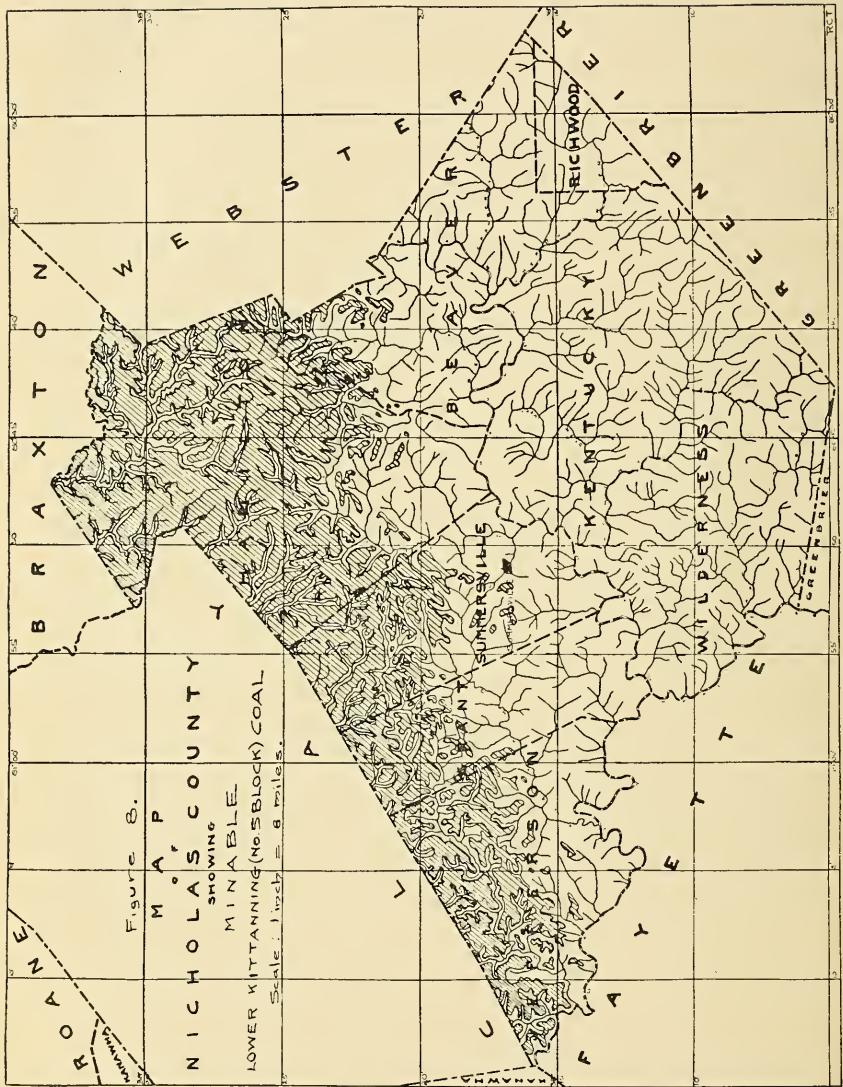
District	Thickness of Coal Assumed. Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Jefferson	2	9.60	6,144	535,265,280	21,410,611
Grant	2	3.00	1,920	167,270,400	6,690,816
Summersville	2	10.10	6,464	563,143,680	22,525,747
Hamilton	3	68.00	43,520	5,687,193,600	227,487,744
Beaver	3	3.20	2,048	267,632,640	10,705,306
Totals		93.90	60,096	7,220,505,600	288,820,224

LOWER KITTANNING (NO. 5 BLOCK) COAL.

The Lower Kittanning (No. 5 Block) Coal, previously discussed in Chapter V, pages 199-200, and shown by outcrop lines on Map II in those portions of the county where its horizon occurs, is found in the ridges of the northern and north-western portions of the county, being apparently of general

occurrence, as it has been found in minable thickness at nearly all of the numerous prospects that have been made for it. It varies in thickness from 4 to 10 feet, being nearly always multiple-bedded, the upper portion being usually soft and gaseous and the lower portion hard and splinty. In quality it is high in volatile matter, low in sulphur and phosphorus, and has an ash content that is almost ideal for coking purposes. As a commercial seam it can be made to produce a large tonnage of easily minable coal, though the expense of removing the bone and slate will detract a considerable amount per ton from the profits of mining. It is by far the most valuable of all the high volatile coals of the northern end of the county, its presence over a large area where it can be worked by drift giving assurance of a great future mining development on this one seam alone.

The coal has been mined for local domestic use at numerous points and has also been used to a considerable extent for railroad fuel on logging operations in the county, and one small commercial mine has recently been opened near Tioga for commercial shipment. In Clay County, however, only a short distance from the Nicholas Line, it is being mined extensively at Widen, where it has established an enviable reputation. It is believed that this seam of coal will prove to be suited for general steaming purposes and probably for by-product coke manufacture, as its high volatile content would indicate a large yield of gas, tar, benzol, and other products of distillation, and the splinty portions would make excellent domestic fuel, as they have the necessary hardness to stand shipment. Figure 8 shows its areal extent.



Lower Kittanning (No. 5 Block) Coal, Jefferson District.

In Jefferson District the Lower Kittanning (No. 5 Block) Coal crops in the high ridges along Twentymile Creek and its tributaries, but has apparently been prospected at only a few points, due partly to the presence of the Coalburg, Campbell Creek, and Eagle Coals at more readily accessible horizons, and partly to the general wooded nature of the region. The following openings and exposures were noted:

Coal Blossom—No. 83 on Map II.

On road, north of Lick Branch of Open Fork of Bells Creek, 2 miles northeast of Dixie; Lower Kittanning (No. 5 Block) Coal; elevation, 1405' B.

Coal blossom, thickness unknown.

The two following openings were examined by Ray V. Hennen, the data on the same having been published in the Braxton and Clay Report of the Survey, page 672:

**Samuel Stephenson (Lewis Gibson) Coal Opening—
No. 84 on Map II.**

On east side of a branch of Sycamore Creek, 4 miles northeast of Vaughan; Lower Kittanning (No. 5 Block) Coal; elevation, 1440' B.; observation by Ray V. Hennen.

	Ft.	In.
Shale, visible	3	0
Sandstone	1	6
Coal, semi-splint	1' 6"	
Coal, gray splint. hard.....	0 7	
Coal, semi-splint	1 5	
Shale, gray, 1" to.....	0 2	
Coal, splinty (slate floor)	0 9	4 5

Coal Opening—No. 85 on Map II.

On head of Ash Fork of Twentymile Creek, 3.6 miles northeast of Vaughan; Lower Kittanning (No. 5 Block) Coal; elevation, 1525' B.; observation by Ray V. Hennen.

Fallen shut, thickness unknown.

Lewis Coal & Land Company Prospect—No. 86 on Map II.

On north side of Hardway Branch of Twentymile Creek, 3.6 miles

S. 58° W. of Harriet; **Lower Kittanning (No. 5 Block) Coal**; elevation, 1730' B.; for stratigraphic position, see Hardway Branch of Twentymile Section page 111.

	Ft.	In.
Coal, reported by Irwin Hughes	8	0

Lower Kittanning (No. 5 Block) Coal, Grant District.

In Grant District the **Lower Kittanning (No. 5 Block) Coal** is present in the high ridges along Twentymile Creek and its branches, and on the heads of Leatherwood Creek and other streams tributary to the Elk River drainage system. Only a few prospects have been made in this region but there is a sufficient number to illustrate the general occurrence and character of the coal, the following having been noted:

Elliott Splint Coal Company Prospect—No. 87 on Map II.

In Henry District, Clay County, on hillside south of Leatherwood Creek, 2.2 miles N. 54° W. of Harriet; **Lower Kittanning (No. 5 Block) Coal**; elevation, 1460' B.

	Ft.	In.
Slate, black		
Coal	1' 9"	
Niggerhead	0	2
Coal, splinty	2	0
Niggerhead	0	1
Coal, splint	2	0
Niggerhead	0	1
Coal, splinty	2 10	8 11
Slate, pavement		

Elliott Splint Coal Company Farm Mine—No. 88 on Map II.

In Henry District, Clay County, on branch of Leatherwood Creek, 2.3 miles N. 33° W. of Harriet; **Lower Kittanning (No. 5 Block) Coal**; elevation, 1397' B.

	Ft.	In.
Sandstone		
Coal, bony splint	1' 0"	
Coal, semi-splint	1	9
Shale, dark-gray	0	2
Coal, splint	2	7
Niggerhead	0	4
Coal, splint	2 7	8 5
Slate, pavement		

Elliott Splint Coal Company Prospect—No. 89 on Map II.

On north side of Leatherwood Creek, 1.7 miles northwest of Harriet; **Lower Kittanning (No. 5 Block) Coal**; elevation, 1455' B.; section by C. E. Krebs.

		Ft.	In.
Coal (shale roof).....	0' 6 "		
Fire clay	1 6		
Coal	0 6		
Fire clay	0 3		
Coal, hard, block	3 8½		
Slate	0 0½		
Coal	0 6		
Slate	0 2		
Coal	1 0	8	2

Coal Prospect—No. 90 on Map II.

On west side of a branch of Leatherwood Creek, 1.8 miles northwest of Harriet; **Lower Kittanning (No. 5 Block) Coal**; elevation, 1480' B.; section by I. C. White as published in Volume II(A), page 556.

		Ft.	In.
Shale, sandy, visible		10	0
Coal	1' 4"		
Bone	0 2		
Coal	1 4		
Shale	0 3		
Coal	4 8		
Bone	0 5		
Coal	2 8	10	10
Concealed		90	0
Kanawha Black Flint		5	0
Concealed		100	0
Sandstone, very massive, to bed of Leatherwood Creek		20	0

Chas. Livengood Heirs Prospect—No. 91 on Map II.

On a branch of Leatherwood Creek, 1.0 mile N. 58° W. of Harriet; **Lower Kittanning (No. 5 Block) Coal**; elevation, 1555' B.

		Ft.	In.
Coal, reported, with one streak of niggerhead.....		6	0

Melvin Williams Farm Mine—No. 92 on Map II.

On head of a branch of Leatherwood Creek, 0.8 mile N. 35° W. of Harriet; **Lower Kittanning (No. 5 Block) Coal**; elevation, 1570' B.

		Ft.	In.
1. Coal, roof, reported	1' 2"		
2. Coal, splint	1 8		
3. Niggerhead	0 2		

		Ft.	In.
4. Coal, splint	2' 8"		
5. Coal, semi-splint	1 0	6	8
6. Slate, pavement.....			

A sample (No. 283R) was collected from Nos. 2, 4, and 5 of section, the composition of which is published under **Mine No. 92** in the Survey Table of Coal Analyses at the end of this Chapter.

Coal Blossom—No. 93 on Map II.

In road, 0.6 mile N. 73° W. of Harriet; **Lower Kittanning (No. 5 Block) Coal**; elevation, 1595' B.; for stratigraphic position, see Harriet (North) Section, page 120.

Coal blossom, thickness unknown.

Lewis Coal & Land Company Prospect—No. 94 on Map II.

On hillside south of Twentymile Creek, 0.9 mile S. 63° W. of Harriet; **Lower Kittanning (No. 5 Block) Coal**; elevation, 1635' B.

		Ft.	In.
1. Shale, sandy, dark		5	0
2. Coal, medium-hard	2' 0"		
3. Niggerhead	0 2		
4. Coal, splinty	4 6		
5. Coal, bony.....	0 11		
6. Coal, splint.....	3 2	10	9
7. Slate, pavement			

A sample (No. 286R) was collected from Nos. 2, 4, and 6 of section, the composition of which is published under **Mine No. 94** in the Survey Table of Coal Analyses at the end of this Chapter.

Geo. H. Alderson Prospect—No. 95 on Map II.

On hillside south of Twentymile Creek, 1 mile N. 73° E. of Harriet; **Lower Kittanning (No. 5 Block) Coal**; elevation, 1780' B.

	Ft.	In.
Fallen shut, reported by T. G. Morris.....	5	0

Lemon Underwood Prospect—No. 96 on Map II.

On ridge at head of Rader Fork of Twentymile Creek, 1.9 miles N. 34° W. of Gilboa; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2085' B.

Fallen shut, thickness unknown.

Coal Blossom—No. 97 on Map II.

In ridge road west of Rader Fork of Twentymile Creek, 1.8 miles N. 42° W. of Gilboa; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2125' B.

Coal blossom, heavy, thickness unknown.

Logan Grose Prospect—No. 98 on Map II.

On ridge east side of Rader Fork of Twentymile Creek, 1.9 miles northwest of Gilboa; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2185' B.

Fallen shut, thickness unknown.

Logan Grose Farm Mine—No. 99 on Map II.

On ridge west of Hutchinson Branch of Peters Creek, 0.8 mile N. 73° E. of Lone Star School; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2175' B.

	Ft.	In.
1. Shale, dark	5	0
2. Shale, gray	2	0
3. Coal, soft	0	9"
4. Coal, splint.....	0	4
5. Coal, semi-splint	0	5
6. Coal, bony splint.....	0	4
7. Coal, splint	1	3
8. Coal, soft	0	2
9. Slate, pavement.....		

A sample (No. 281R) was collected from Nos. 3, 4, 5, 6, 7, and 8 of section, the composition of which is published under **Mine No. 99** in the Survey Table of Coal Analyses at the end of this Chapter.

Lower Kittanning (No. 5 Block) Coal, Summersville District.

In Summersville District the **Lower Kittanning (No. 5 Block) Coal** crops in the ridges along the waters of Twentymile Creek, on the tributaries of the Elk River drainage system, and on the waters of Peters and Muddlety Creeks. It has been opened at numerous points and on Muddlety has been used many years for local domestic fuel. The following openings and exposures were noted:

Joseph Ramsbarger Prospect—No. 100 on Map II.

On hill between Rader and Neff Forks of Twentymile Creek, 2.5 miles N. 65° W. of Gilboat; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2150' B.

Fallen shut, thickness unknown.

Elk River Coal & Lumber Company Prospect— No. 101 on Map II.

On west side of Lilly Fork of Buffalo Creek, 3 miles northeast of Harriet; **Lower Kittanning (No. 5 Block) Coal**; elevation, 1485' B.; for details of section and stratigraphic position, see Beech Fork of Lilly Section, page 131.

Coal Blossom—No. 102 on Map II.

On divide between Twentymile Creek and Beech Fork of Lilly Fork of Buffalo Creek, 1 mile S. 33° W. of Dade; **Lower Kittanning (No. 5 Block) Coal**; elevation, 1820' B.

Coal blossom, thickness unknown.

Stevenson & Heggerty Prospect—No. 103 on Map II.

On south hillside of Twentymile Creek, 2.5 miles S. 79° W. of Muddlety; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2035' B.

	Ft.	In.
Fallen shut, coal, reported by Wm. McKinney 7' 0" to	8	0

Wm. Wilson Prospect—No. 104 on Map II.

In road, north of Libertybowl Branch of Beech Fork of Lilly Fork of Buffalo Creek, 0.9 mile N. 7° W. of Dade; **Lower Kittanning (No. 5 Block) Coal**; elevation, 1760' B.

	Ft.	In.
Coal, reported	4	0

Wm. Wilson Prospect—No. 105 on Map II.

In road, north of Libertybowl Branch of Beech Fork, 0.8 mile N. 7° W. of Dade; **Lower Kittanning (No. 5 Block) Coal**; elevation, 1760' B.
Fallen shut, thickness unknown.

Caroline Workman Farm Mine—No. 106 on Map II.

On hillside south of Robinson Fork of Beech Fork of Lilly Fork of Buffalo Creek, 2.3 miles N. 63° W. of Muddlety; **Lower Kittanning**

(No. 5 Block) Coal; elevation, 1800' B.

	Ft.	In.
1. Slate, dark, soft, visible.....	2	0
2. Coal, splint..... 2' 6"		
3. Niggerhead..... 0 4		
4. Coal, splint..... 1 7	4	5
5. Slate, pavement.....		

A sample (No. 273R) was collected from Nos. 2 and 4 of section, the composition of which is published under Mine No. 106 in the Survey Table of Coal Analyses at the end of this Chapter.

Coal Blossom—No. 107 on Map II.

On Lonetree Mountain, south of Peters Creek, 0.8 mile N. 84° W. of Summersville; Lower Kittanning (No. 5 Block) Coal; elevation, 2520' B.; for stratigraphic position see Summersville Section, page 126. Coal blossom, thickness unknown.

Craig Heirs Prospect—No. 108 on Map II.

On hillside west of Muddlety Creek, 2.8 miles S. 15° W. of Muddlety; Lower Kittanning (No. 5 Block) Coal; elevation 2360' B. Fallen shut, thickness unknown.

Coal Blossom—No. 109 on Map II.

On hillside west of Muddlety Creek, 2.4 miles S. 25° W. of Muddlety; Lower Kittanning (No. 5 Block) Coal; elevation, 2320' B. Coal blossom, at spring, thickness unknown.

Coal Blossom—No. 110 on Map II.

On hillside east of Fockler Branch of Muddlety Creek, 2.5 miles S. 29° W. of Muddlety; Lower Kittanning (No. 5 Block) Coal; elevation, 2330' B. Coal blossom, thickness unknown.

Elijah Bobbitt Farm Mine—No. 111 on Map II.

On hillside south of Trout Run of Muddlety Creek, 1.3 miles S. 45° W. of Muddlety; Lower Kittanning (No. 5 Block) Coal; elevation, 2165' B.

	Ft.	In.
Coal, with slate, reported.....	5	0

Lower Kittanning (No. 5 Block) Coal, Hamilton District

In Hamilton District the Lower Kittanning (No. 5 Block) Coal crops on the waters of Buffalo and Strange Creeks, Birch River, and Muddlety and Beaver Creeks, being well up in the hills at most points, except on Beaver Creek where the general level of the drainage is higher than on the other streams mentioned. The coal has been widely prospected and has been used for local domestic fuel at numerous points, and to a limited extent for railroad use in logging operations.

In Buffalo District, Clay County, the coal has been mined extensively for many years by the Elk River Coal and Lumber Company at Widen, on Buffalo Creek, the mine entry being less than one mile from the Nicholas County Line. Inasmuch as the workings of this mine penetrate Nicholas County, the following data, secured by Ray V. Hennen and previously published in the Braxton and Clay Report of the Survey, pages 657-661, are of pertinent interest, the serial number of the mine being changed to correspond to Map II of Nicholas County:

"The No. 5 Block Coal is operated on an extensive scale near Widen in Buffalo District, Clay County, by the Elk River Coal and Lumber Company at their Rich Run Mine—No. 112 on Map II—on Rich Run, $\frac{1}{4}$ mile southeast of Widen, this being the only commercial mine on this bed in the territory of this Report, [Braxton and Clay]. The following is a general section of the bed as determined by the writer at this mine:

Elk River Coal & Lumber Co. Rich Run Mine— No. 112 on Map II.

On Rich Run, $\frac{1}{2}$ mile southeast of Widen; No. 5 Block (Lower Kittanning) Coal; elevation, 1350' B.

	Ft.	In.
1. Sandstone		
2. Coal, semi-splint, "rooster" bench, roof of mine, 9" above 2" below top, 0" to.....	1'	9"
3. Shale, argillaceous, dark, draw slate	0	6
4. Coal, semi-splint, "top coal".....	1	2
5. Slate, black, "middle band", 4" to..	0	6
6. Coal, splint, hard, "main bench",..	4	8
7. Slate, black, medium-hard, "bottom slate", 12" to.....	0	6

	Ft.	In.
8. Coal, splint, "bottom coal", not taken up, 0" to..... 1' 6".....	10	7

"Nos. 4, 5, and 6 constitute the 'mining section', and No. 7 the pavement.

"The writer measured a section, collected two samples for analysis in 1st Right Entry off 4th East, Opening 5½ of Rich Run Mine above mentioned, and obtained the following data:

	Ft.	In.
1. Coal, "rooster", roof.....		
2. Slate, dark-gray, "draw slate", 6" to.....	0	8
3. Coal, semi-splint, bright..... 1' 2"		
4. Slate, black..... 0 6		
5. Coal, gray splint (slate floor)..... 4 11	6	7

"Coal owned and operated by Elk River Coal and Lumber Company; principal offices, Dundon, W. Va., and Harrisburg, Pa.; capacity, 2,000 tons daily, with output of over 1,600 tons daily; men employed, 225 loaders, 16 to 20 machine runners, 16 motormen, 30 inside ordinary laborers, and 30 outside ordinary laborers; coal shipped east and west, mostly east; used for steam and domestic fuel and the manufacture of gas; mixed with Westmoreland (Pa.) coal at Philadelphia, Pa., it gave highly satisfactory results in the manufacture of gas; butts run S. 88° 30' W.; faces, N. 1° 30' W.; authority for mine data, R. T. Price, Superintendent."

"The composition of the sample from the mining section, including Nos. 3 and 5, is given under No. 112 in the table of coal analyses at the end of this Chapter as reported by Messrs. Hite and Krak under Laboratory No. 902H. The writer also collected a sample of the main bench—No. 5 only of section—at this point, the composition of which, as reported under Laboratory No. 903H, is published in the same table of analyses under No. 112. The results speak for themselves as to the high-grade character of the No. 5 Block at this mine which operated 304 days during 1914 and had an output of 512,000 tons for the year, according to Superintendent Price. The writer also collected a sample of the "bottom coal" mentioned in the above general section of the bed at Room 1 off Fifth Opening of the Rich Run Mine, the composition of which as reported under Laboratory No. 904H, is given under No. 112 in the table of analyses at the end of this Chapter. This bottom coal is also very pure and it is planned to take it up in some portions of the mine where the "rooster" and "top" coals of the general section have been cut away by the overlying East Lynn Sandstone, a feature that happens in South Entry off No. 5½ Opening on the divide between Pheasant Run and Turkey Creek.

"Through the courtesy of Mr. R. T. Price, Superintendent of this mine, the Survey was able to get the following very complete analyses of samples collected recently from the Rich Run Mine by the United States Bureau of Mines, the results of which are as follows, from samples collected by E. Russell Lloyd and chemical results by A. C. Fieldner:

"Coal-Analysis Report.

Lab. No. 21816. Can No. 162
 Operator—Elk River Coal & Lumber Company; Rich Run Mine.
 State—W. Va. County—Clay. **Bed—No. 5 Block.**
 Town—Widen; terminal of Buffalo Creek & Gauley R. R.
 Location in Mine—End of 1st E. entry heading No. 5½; 2,000 ft. S.
 60° E. from opening; about 800 ft. from outcrop.
 Method of sampling—Standard. Net weight g. 1127.1.
 Date of sampling—4-9-15. Date of Lab. sampling—4-17-15. Date of
 analysis—4-27-15.
 For B. of M. section—U. S. G. S.
 Air-Dry Loss 1.5.

	Coal (Air-Dried)	Coal (As Received)	Coal (Moisture (Moisture Free) & Ash Free)	Coal (Moisture (Moisture Free) & Ash Free)
Moisture	1.51	2.49	....	....
Volatile matter	35.99	35.63	36.54	39.35
Fixed Carbon	55.47	54.92	56.32	60.65
Ash	7.03	6.96	7.14	....
Totals.....	100.00	100.00	100.00	100.00
Sulphur .....	.87	.86	.88	.95
Calorific Value } Determined } B. T. U..13806	Calories 7670	7593	7787	8396
		13667	14017	15095

"Coal-Analysis Report.

Lab. No. 21817. Can No. 158.
 Operator—Elk River Coal & Lumber Co. Mine—Rich Run Mine.
 State—W. Va. County—Clay. **Bed—No. 5 Block.**
 Town—Widen; terminal of Buffalo Creek & Gauley R. R.
 Location in mine—Room 15, 2nd right off S. entry No. 5½; 1200 ft.
 S. W. from mine mouth, about 150 ft. from outcrop.
 Method of sampling—Standard. Net weight g. 1124.0.
 Date of Sampling—4-9-15. Date of Lab. sampling—4-17-15. Date of
 analysis—4-27-15. For B. of M. section—U. S. G. S.
 Air-Dry Loss 1.5.

	Coal (Air-Dried)	Coal (As Received)	Coal (Moisture (Moisture Free) & Ash Free)	Coal (Moisture (Moisture Free) & Ash Free)
Moisture	1.41	2.84	....	....
Volatile Matter	35.34	34.83	35.85	39.15
Fixed Carbon	54.94	54.14	55.72	60.85
Ash	8.31	8.19	8.43	....
Totals.....	100.00	100.00	100.00	100.00
Sulphur	1.11	1.07	1.12	1.22
Calorific Value } Determined } B. T. U..13648	Calories. 7582	7472	7690	8398
		13450	13842	15116

"Coal-Analysis Report.

Lab. No. 21818-F. Composite sample of Lab. Nos. 21816 and 21817.
 Operator—Elk River Coal & Lumber Co. Mine—Rich Run.
 State—W. Va. County—Clay. **Bed—No. 5 Block.**
 Town—Widen; terminal of Buffalo Creek and Gauley R. R.
 Air-Dry Loss 1.2.

	Coal (Air-Dried)	Coal (As Received)	Coal (Moisture Free) &	Coal (Moisture & Ash Free)
Moisture	1.43	2.64	....	....
Volatile Matter	35.92	35.48	36.44	39.51
Fixed Carbon	55.00	54.32	55.80	60.49
Ash	7.65	7.56	7.76	....
Totals.....	100.00	100.00	100.00	100.00
Hydrogen	5.25	5.33	5.18	5.61
Carbon	76.84	75.89	77.95	84.51
Nitrogen	1.50	1.48	1.52	1.65
Oxygen	7.77	8.76	6.58	7.13
Sulphur .....	.99	.98	1.01	1.10
Ash	7.65	7.56	7.76	....
Totals.....	100.00	100.00	100.00	100.00
Calorific Value } Determined } Calculated—Calories .. Calculated—B. T. U. ...	Calories. 7626 B. T. U..13727	7532 13558 7612 13702	7736 13925	8387 15097

“Coal-Analysis Report.

Lab. No. 21892—Sample of Coal—Can. No. 165.

Operator—Elk River Coal & Lumber Co.

Mine—Rich Run Mine.

State—W. Va. County—Clay. Bed—No. 5 Block.

Town—Widen; terminal of Buffalo Creek & Gauley R. R.

Location in mine—2,000 ft. S. 60° E. from mouth; end of 1st East entry, heading No. 5½.

Method of sampling—Standard. Net weight g. 1129.0. Date of sampling—4-9-15. Date of Lab. sampling—4-21-15. Date of analysis—5-1-15.

Air-Dry Loss 1.5.

	Coal (Air-Dried)	Coal (As Received)	Coal (Moisture Free) &	Coal (Moisture & Ash Free)
Moisture	1.65	3.09	....	....
Volatile Matter	37.00	36.46	37.62	40.12
Fixed Carbon	55.22	54.41	56.15	59.88
Ash	6.13	6.04	6.23	....
Totals.....	100.00	100.00	100.00	100.00
Sulphur	1.51	1.49	1.54	1.64
Calories	7783	7669	7914	8439
B. T. U.	14009	13804	14245	15190

“This last given represents a sample of the ‘rooster’ coal, taken at same point as No. 21816. The results of the foregoing analyses and calorific tests of No. 5 Block Coal by the U. S. Bureau of Mines agree closely with those determined from the same mine by Messrs. Hite and Krak of the West Virginia Geological Survey.”

That portion of Hamilton District lying on the waters of Buffalo Creek and mostly covered by virgin woodland was

thoroughly prospected and proved several years ago by Capt. Baird Halberstadt, an eminent mining engineer, of Pottsville, Pa., most of the work having been done by means of an ingenious hand-auger, devised by himself, drift entries for sampling having been made at a few points. The two following openings were driven under cover and sampled:

**Elk River Coal and Lumber Company Prospect—
No. 113 on Map II.**

On hillside west of a branch of Turkey Creek, 1.5 miles due south of Widen; Lower Kittanning (No. 5 Block) Coal; section by Capt. Baird Halberstadt.

	Ft.	In.
Coal	0' 5 "	
Slate	0 9	
Coal	0 11½	
Slate	0 6½	
Coal	1 4	
Slate	0 8	
Coal	2 1½	
Bone	0 1	
Coal	0 9½	7 8

**Elk River Coal and Lumber Company Prospect—
No. 114 on Map II.**

On hillside east of Taylor Creek, 2.2 miles S. 5° E. of Widen; Lower Kittanning (No. 5 Block) Coal; elevation, 1483' L.; section by Capt. Baird Halberstadt.

	Ft.	In.
Coal and bone.....	1' 1 "	
Slate	0 8	
Coal	1 5½	
Slate	0 5	
Coal	4 2	7 9½

Analyses of coal from these two openings, as made by McCreath, of Harrisburg, Pa., and reported to Capt. Halberstadt, are as follows:

	No. 113 Per cent.	No. 114 Per cent.
Moisture	2.020	1.246
Volatile Matter.....	34.580	36.064
Fixed Carbon.....	56.433	57.039
Ash	6.360	4.940
Sulphur	0.607	0.711
Totals	100.000	100.000

The following data on the auger prospects of Capt. Halberstadt in this vicinity have been made available to the Survey through the courtesy of Mr. J. G. Bradley, General Manager of Elk River Coal and Lumber Company, the same having been published by Ray V. Hennen in the Braxton and Clay Report, pages 655-656, the following being located in Hamilton District:

Auger Prospect Borings by Capt. Baird Halberstadt.

No. on Map II Auger Boring	Location of Auger Prospect	Lower Kittanning (No. 5 Block) Coal	
		Elevation above sea, spirit-level	Total Thickness of Bed
115	On east side of Elm Creek, 0.6 mile southeast of Clay County Line.....	1514	4' 3"
116	On east side of Elm Creek, 1.2 miles southeast of Clay County Line.....	1534	6' 5"
117	On point east of mouth of Donahoe Fork of Turkey Creek.....	1446	6' 0"
118	On hillside north of Taylor Creek, 0.7 mile southeast of Donahoe Fork....	1484	2' 11"
119	On hillside south of Turkey Creek, 1.6 miles from Clay County Line.....	1569	2' 8"
120	On hillside north of Turkey Creek, 1.7 miles from Clay County Line.....	1511	2' 10"
121	On a northern branch of Turkey Creek, 2 miles from Clay County Line.....	1630	2' 3"
122	On hillside south of Turkey Creek, 2.2 miles from Clay County Line.....	1676	4' 8"
123	On hillside north of Turkey Creek, 2.7 miles from Clay County Line.....	1876	3' 6"
124	On hillside north of Taylor Creek, 2.3 miles from Clay County Line.....	1793	7' 0"
125	On a south branch of Buffalo Creek, 1.5 miles southeast of Widen.....	1395	2' 5"
126	On hillside east of Buffalo Creek, 0.3 mile from Clay County Line.....	1387	7' 0"
127	On hillside east of Buffalo Creek, 0.6 mile from Clay County Line.....	1424	3' 0"
128	On Cherry Run of Buffalo Creek, 0.9 mile from Clay County Line.....	1468	2' 9"
129	On Cherry Run of Buffalo Creek, 1.3 miles from Clay County Line.....	1532	3' 0"
130	On south side of Cherry Run, 1.1 miles from Clay County Line.....	1449	2' 8"
131	On point southeast of mouth of Ramp Run, 2 miles from Clay County Line..	1671	1' 7"

**Elk River Coal & Lumber Company Prospect—
No. 132 on Map II.**

On hillside south of Buffalo Creek, 3.0 miles S. 53° E. of Widen; Lower Kittanning (No. 5 Block) Coal; elevation, 1580' B.; fallen shut, reported by Ira Conner as follows:

	Ft.	In.
Sandstone		
Slate, 6' to.....	8	0
Coal, 1' 6" to.....	2	0"
Slate, 0' 6" to.....	0	8
Coal, hard, splint.....	4	0
	6	8
Slate, pavement.....		

**Elk River Coal & Lumber Company Prospect—
No. 133 on Map II.**

On hillside south of Buffalo Creek of Ramp Run, 3.6 miles S. 74° E. of Widen; Lower Kittanning (No. 5 Block) Coal; elevation, 1710' B.

	Ft.	In.
1. Sandstone		
2. Coal, bony splint.....	0	8"
3. Slate, dark.....	0	9
4. Coal, hard, splinty.....	4	10
	6	3
5. Slate, pavement and concealed.....	5	0
6. Coal prospect, fallen shut, bottom ply.....		

A sample (No. 258R) was collected from Nos. 2 and 4 of section, the composition of which is published under Mine No. 133 in the Survey Table of Coal Analyses at the end of this Chapter.

**Elk River Coal & Lumber Company Prospect—
No. 134 on Map II.**

On hillside north of Ramp Run of Buffalo Creek. 3.5 miles S. 77° E. of Widen; Lower Kittanning (No. 5 Block) Coal; elevation, 1710 B. Fallen shut, thickness unknown.

W. T. Perkins Farm Mine—No. 135 on Map II.

In Birch District, Braxton County, 0.1 mile west of Nicholas County Line; east side of Strange Creek, 2.5 miles northwest of Morris P. O.; Lower Kittanning (No. 5 Block) Coal; elevation, 1120' B.

	Ft.	In.
Sandstone, massive.....		

		Ft.	In.
Coal	2' 1"		
Slate, bony.....	0 1		
Coal	0 6		
Slate, dark.....	0 2		
Coal	0 6		
Slate	0 2		
Coal, partly splint.....	1 4		
Shale, gray.....	0 4		
Coal, hard.....	2 10	8	0
<hr/>			
Slate, pavement.....			

Dille Farm Mine—No. 136 on Map II.

On south side of Brushy Fork of Strange Creek, 0.7 mile south of Wade; **Lower Kittanning (No. 5 Block) Coal**; elevation, 1155' B.; observation by Ray V. Hennen (see Braxton and Clay Report, page 646).

		Ft.	In.
Sandstone, grayish-white, roof.....			
Coal and slate, mixed.....	2' 0"		
Slate, gray.....	0 10		
Coal, splinty, (slate floor).....	2 0	4	10
<hr/>			

Samuel Murphy Farm Mine—No. 137 on Map II.

On hillside south of Trace Fork of Strange Creek, 3.5 miles N. 78° W. of Birch River village; **Lower Kittanning (No. 5 Block) Coal**; elevation, 1175' B.; observation by Ray V. Hennen (see Braxton and Clay Report, page 646).

		Ft.	In.
Sandstone, grayish-white, makes cliff, visible.....		20	0
Slate, sandy		4	0
Coal	0' 4"		
Bone hard.....	0 5		
Coal, semi-splint.....	1 4		
Slate, sandy.....	0 5		
Coal, splint.....	0 6	3	0
<hr/>			

Coal Blossom—No. 138 on Map II.

On hillside east of Strange Creek, 1.2 miles southwest of Morris; **Lower Kittanning (No. 5 Block) Coal**; elevation, 1230' B. Coal blossom, in spring, thickness unknown.

A. E. Henderson Farm Mine—No. 139 on Map II.

On north side of Lick Run of Strange Creek, 0.6 mile N. 32° E. of Dille; **Lower Kittanning (No. 5 Block) Coal**; elevation, 1260' B. Fallen shut, thickness unknown.

Henry Butcher Farm Mine—No. 140 on Map II.

Buffalo District, Clay County, on north side of Dille Run of Strange Creek, 0.3 mile N. 6° W. of Dille; Lower Kittanning (No. 5 Block) Coal; elevation, 1270' B.

Fallen shut, thickness unknown.

John Wilson Farm Mine—No. 141 on Map II.

Buffalo District, Clay County, on north side of Dille Run of Strange Creek, 0.8 mile west of Dille; Lower Kittanning (No. 5 Block) Coal; elevation, 1260' B.

	Ft.	In.
Coal, reported by John Wilson.....	10	1

J. M. Butcher Farm Mine—No. 142 on Map II.

Buffalo District, Clay County, on east side of Strange Creek, at Dille; Lower Kittanning (No. 5 Block) Coal; elevation, 1275' B.

	Ft.	In.
1. Shale, sandy.....		
2. Coal, roof.....	1'	0"
3. Coal, soft.....	1	0
4. Slate, dark.....	0	7
5. Coal, medium-soft.....	0	7
6. Slate, hard.....	0	8
7. Coal, splint.....	0	7
8. Coal, medium-soft.....	2	2
	<hr style="width: 50px; margin-left: auto; margin-right: 0;"/>	6
9. Slate, pavement.....		7

A sample (No. 255R) was collected from Nos. 3, 5, 7, and 8 of section, the composition of which is published under Mine No. 142 in the Survey Table of Coal Analyses at the end of this Chapter.

Andrew Brown Farm Mine—No. 143 on Map II.

Buffalo District, Clay County, on east side of Strange Creek, at Dille; Lower Kittanning (No. 5 Block) Coal; elevation, 1275' B.

	Ft.	In.
Coal, (with two streaks of slate and one of nigger-head), reported.....	6	0

The above opening, which was half filled with water at the time of the writer's visit, has supplied a large amount of local domestic fuel, its output being 6,000 bushels yearly.

Coal Prospect—No. 144 on Map II.

Buffalo District, Clay County, on east bank of Strange Creek, 0.3 mile south of Dille; Lower Kittanning (No. 5 Block) Coal; elevation, 1290' B.

Fallen shut, thickness unknown.

Elk River Coal & Lumber Company Farm Mine—
No. 145 on Map II.

On west side of Road Fork of Strange Creek, 0.9 mile S. 21° E. of Dille; Lower Kittanning (No. 5 Block) Coal; elevation, 1350' B.

	Ft.	In.
1. Sandstone, massive.....		
2. Coal	0'	8"
3. Shale, hard.....	1	0
4. Coal, splinty.....	1	7
5. Coal, soft.....	0	8
6. Shale, gray.....	0	6
7. Coal, medium-soft.....	0	6
8. Slate, gray.....	0	1
9. Coal, bony.....	0	7
10. Coal, hard, splinty.....	3	1
	<hr style="width: 10%; margin-left: auto; margin-right: 0;"/>	
		8 8
11. Slate, pavement.....		

A sample (No. 256R) was collected from Nos. 4, 5, 7, and 10 of section, the composition of which is published under Mine No. 145 in the Survey Table of Coal Analyses at the end of this Chapter.

Elk River Coal & Lumber Company Prospect—
No. 146 on Map II.

On hillside north of Road Fork of Strange Creek, 1.4 miles S. 30° E. of Dille; Lower Kittanning (No. 5 Block) Coal; elevation, 1430' B.
Fallen shut, thickness unknown.

Coal Blossom—No. 147 on Map II.

On hillside south of Big Run of Birch River, 2.2 miles N. 19° W. of Birch River; Lower Kittanning (No. 5 Block) Coal; elevation, 1340' B.
Coal blossom, thickness unknown.

Cora Brown Farm Mine—No. 148 on Map II.

On hillside west of Birch River, 2.2 miles N. 46° W. of Birch River village; Lower Kittanning (No. 5 Block) Coal; elevation, 1245' B.;

observation by Ray V. Hennen (see Braxton and Clay Report, page 646).

	Ft.	In.
Sandstone, massive, visible.....	5	0
Shale, dark, sandy, plant fossils abundant.....	1	3
Coal	0'	1½"
Slate, medium-hard, dark.....	0	4
Coal, gas, medium-hard.....	2	1
Slate, dark-gray.....	0	10
Coal, gas, hard (slate floor).....	0	6
	3	10½

Joseph Tinnil Prospect—No. 149 on Map II.

On hillside east of Birch River, 0.8 mile N. 25° W. of Birch River village; **Lower Kittanning (No. 5 Block) Coal**; elevation, 1470' B.

	Ft.	In.
Slate, black, cancell.....	0	10
Shale, black.....	0	10
Coal, medium-hard.....	3	3
Slate, pavement.....		

Dr. J. M. Brockerhoff Coal Auger Boring—No. 150 on Map II.

On hillside west of Shant Branch of Powell Creek, 2.5 miles S. 32° W. of Birch River village; **Lower Kittanning (No. 5 Block) Coal**; elevation, 1730' B.; thickness reported by Capt. Baird Halberstadt.

	Ft.	In.
Coal, smut (with 4" to 5" of clay).....	2	11

Dr. J. M. Brockerhoff Coal Auger Boring—No. 151 on Map II.

On road, west side of Shant Branch of Powell Creek, 2.6 miles S. 28° W. of Birch River village; **Lower Kittanning (No. 5 Block) Coal**; elevation, 1745' B.; section reported by Capt. Baird Halberstadt.

	Ft.	In.
Wash	9	4
Coal and mud.....	2	8

Coal Prospect—No. 152 on Map II.

On hillside east of Shant Branch of Powell Creek, 2.6 miles S. 27° W. of Birch River village; **Lower Kittanning (No. 5 Block) Coal**; elevation, 1740' B.; for stratigraphic position, see Shant Branch Section, page 141.

Fallen shut, reported "Big Vein".

W. C. Brown Farm Mine—No. 153 on Map II.

On hillside north of Mill Creek, 1.6 miles N. 43° E. of Birch River village; **Lower Kittanning (No. 5 Block) Coal**; elevation, 1585' B.; observation by Price.

	Ft.	In.
Shale, gray and brown.....		
Coal and shale streaks (weathered fragments)	0'	2½"
Coal, soft.....	0	7½"
Coal, medium-hard.....	0	6½"
Coal, soft.....	0	8
Shale, gray, argillaceous.....	0	9½"
Coal, medium-hard.....	1	2
	4	0

J. L. Davis Farm Mine—No. 154 on Map II.

On hillside east of Mill Creek, 3.1 miles N. 46° E. of Birch River village; **Lower Kittanning (No. 5 Block) Coal**; elevation, 1610' B.; observation by Price.

	Ft.	In.
Sandstone		
Bone	0	2½"
Coal	0'	1½"
Shale, soft.....	0	6
Coal	0	2½"
Shale, black.....	0	6½"
Coal	1	0
Bone	0	3½"
Coal, concealed in water.....	2	0½"
	4	8½"

Coal Blossom—No. 155 on Map II.

On hillside south of Birch River, 1.1 miles S. 63° E. of Birch River; **Lower Kittanning (No. 5 Block) Coal**; elevation, 1770' B.; observation by Reger and Price; for stratigraphic position see Mouth of Anthony Creek Section, page 142.

Coal blossom, thickness unknown.

Tioga Lumber Company Prospect—No. 156 on Map II.

On Mudlick Run of Anthony Creek, 2.5 miles S. 61° E. of Birch River village; **Lower Kittanning (No. 5 Block) Coal**; elevation, 1855' B.; for stratigraphic position and details see Mudlick Run of Anthony Creek Section, page 143.

Tioga Lumber Company Prospect—No. 157 on Map II.

On head of Cabin Run of Anthony Creek 4 miles northwest of Tioga; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2025' B. Fallen shut, thickness unknown.

Tioga Lumber Company Prospect—No. 158 on Map II.

On east side of Anthony Creek, 3.6 miles S. 45° E. of Birch River village; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2020' B.; observation by Reger and Price; for details and stratigraphic position see Rich Fork of Anthony Creek Section, page 144.

Tioga Lumber Company Prospect—No. 159 on Map II.

On hillside east of Road Fork of Anthony Creek, 2.5 miles N. 55° E. of Tioga; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2085' B.

	Ft.	In.
Slate, black.....		
Coal, medium-hard	0'	7"
Niggerhead	0	2
Coal	0	3
Niggerhead	0	2
Coal, splinty.....	3	5
Slate, gray.....	0	1
Coal	0	4
	5	0
Slate, pavement.....		

Tioga Lumber Company Prospect—No. 160 on Map II.

On south side of Road Fork of Anthony Creek, 2.6 miles N. 63° W. of Tioga; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2075' B.; observation by Reger and Price.

	Ft.	In.
1. Shale		
2. Coal, soft.....	0'	7 "
3. Coal, bony splint.....	0	2
4. Coal, soft.....	0	6
5. Coal, splint.....	0	3
6. Coal, soft.....	0	9
7. Shale, dark.....	0	0½
8. Coal, soft.....	2	0½
	4	4
9. Shale, pavement.....		

A sample (No. 248R) was cut by the writer from Nos. 2, 4, 5, 6, and 8 of section, the composition of which is published under **Mine No. 160** in the Survey Table of Coal Analyses at the end of this Chapter.

Tioga Lumber Company Prospect—No. 161 on Map II.

On Road Fork of Anthony Creek, 2.7 miles N. 71° W. of Tioga; Lower Kittanning (No. 5 Block) Coal; elevation, 2131' L.

	Ft.	In.
Shale		
Bone	0	1
Coal, medium-hard.....	0'	4½"
Bone	0	1
Coal, medium-hard.....	0	2½
Bone	0	3½
Coal, hard.....	2	8
Shale	0	0½
Coal, hard.....	0	9
	.....4	5

A sample cut from this opening by Mr. Harrison is published under **Mine No. 161** in the Tioga Lumber Company Table of Coal Analyses at the end of this Chapter.

Tioga Lumber Company Prospect (John Roberts Opening)—
No. 162 on Map II.

On hillside north of Left Fork of Poplar Creek, 2.3 miles N. 78° W. of Boggs; Lower Kittanning (No. 5 Block) Coal; elevation, 2000' B.

	Ft.	In.
1. Slate, dark.....		
2. Coal, slaty.....	1'	3"
3. Slate, dark.....	3	0
4. Coal, somewhat slaty.....	1	1
5. Slate, dark.....	0	2
6. Coal, splint.....	2	8
7. Coal, bony splint.....	0	3
8. Coal, splint.....	1	6
	.....	9
		11
9. Slate, pavement.....		

A sample (No. 332R) was collected from Nos. 6, 7, and 8 of section, the composition of which is published under **Mine No. 162** in the Survey Table of Coal Analyses at the end of this Chapter.

Tioga Lumber Company Prospect—No. 163 on Map II.

On hillside south of Redoak Branch of Poplar Creek, 2.8 miles S. 82° W. of Boggs; Lower Kittanning (No. 5 Block) Coal; elevation, 1965' B.

Fallen shut, thickness unkuown.

The following prospect is reported by Geo. A. Harrison, Engineer for the Tioga Lumber Company:

Tioga Lumber Company Prospect—No. 163A on Map II.

On west side of Poplar Creek, 3 miles northwest of Tioga; **Lower Kittanning (No. 5 Block) Coal**; elevation, 1982' L.; observation by Geo. A. Harrison.

	Ft.	In.
Roof		
Coal (with ½" of slate).....	3	10

A sample was cut from this opening by Mr. Harrison, the composition of which is published under **Mine No. 163A** in the Tioga Lumber Company Table of Coal Analyses at the end of this Chapter.

Tioga Lumber Company Coal Prospect—No. 164 on Map II.

On hillside west of Pantherlick Branch of Poplar Creek, 2.6 miles N. 35° W. of Tioga; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2035' B.

Fallen shut, reported as 5' 6" thick with 3" of bone by Tioga Lumber Company.

Tioga Lumber Company Coal Prospect—No. 165 on Map II.

On hillside east of Pantherlick Branch of Poplar Creek, 2.2 miles N. 44° W. of Tioga; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2045' B.

	Ft.	In.
1. Slate		
2. Coal, splint.....	1'	6"
3. Niggerhead	0	2
4. Coal, splint.....	3	3
5. Slate, gray.....	0	1
6. Coal, splint.....	0	5
7. Slate, pavement.....		

A sample (No. 334R) was collected from Nos. 2, 4, and 6 of section, the composition of which is published under **Mine No. 165** in the Survey Table of Coal Analyses at the end of this Chapter.

A sample was cut from this opening by Mr. Harrison, also, its composition being published in the Tioga Lumber Company Table of Coal Analyses at the end of this Chapter.

Tioga Lumber Company Prospect—No. 166 on Map II.

In Glade District, Webster County, on a short branch of Barnet Run of Birch River, 1.5 miles S. 60° W. of Boggs; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2180' B.; observation by Reger and Price.

	Ft.	In.
1. Coal, bony, thickness concealed.....		
2. Coal, splinty.....	1'	2½"
3. Slate, black.....	0	3
4. Coal, splint.....	2 1	3 6½
5. Slate, pavement.....		

A sample was cut from this opening by Mr. Harrison, its composition being published under **Mine No. 166** in the Tioga Lumber Company Table of Coal Analyses at the end of this Chapter. A sample (No. 1P) was cut from the mining section by Dr. Price, its composition being published in the Survey Table at the end of this Chapter under the same mine number.

**Tioga Lumber Company, Poplar Creek Mine—
No. 167 on Map II.**

On head of Poplar Creek, 1.7 miles N. 11° W. of Tioga; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2168' L.

	Ft.	In.
Slate, dark.....		
Coal, hard, splinty.....	0'	11"
Bone	0	1
Coal	0	3
Bone	0	3
Coal, hard, splinty.....	2	5
Coal, bony	0 9	4 3
Slate, pavement.....		

Coal from the above opening, now abandoned, was used for many years on the logging locomotives of the Tioga Lumber Company. The analysis of a sample collected by Mr. Harrison is published under **Mine No. 167** in the Tioga Lumber Company Table of Coal Analyses at the end of this Chapter.

Coal Blossom—No. 168 on Map II.

On hillside north of Birch River, 0.3 mile north of Skyles; **Lower**

Kittanning (No. 5 Block) Coal; elevation, 1841' L.; for stratigraphic position see Skyles Section, page 147.

	Ft.	In.
Coal, visible	2	0

The following opening was examined by Ray V. Hennen, the data on the same having been published in the Braxton and Clay Report of the Survey, page 641:

Coal Opening—No. 169 on Map II.

On hillside north of a branch of Skyles Creek, 0.5 mile southwest of Waggy; **Lower Kittanning (No. 5 Block) Coal**; elevation, 1825' B.; investigation by Ray V. Hennen.

	Ft.	In.
Sandstone, medium-grained, makes great cliff, East Lynn	40	0
Shale, dark, bluish-gray, plant fossils abundant.....	2	0
Sandstone, dark, plant fossils, no marine fossils.....	0	3
Coal, semi-splint.....	1' 5 "	"
Slate, black, bony.....	0	1½
Coal, semi-splint (slate floor).....	2	2½
	3	9

Tinnil & Hill Farm Mine—No. 170 on Map II.

On hillside south of Trout Run of Muddlety Creek, 1.0 mile S. 24° W. of Muddlety; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2205' B.

	Ft.	In.
Slate, black.....		
Coal	0' 10 "	"
Slate, black.....	0	1
Coal, splinty.....	1	2½
Slate, black.....	0	4½
Coal, splint.....	2	4
	4	10
Slate, pavement.....		

Lee Fitzwater Farm Mine—No. 171 on Map II.

On a branch of Trout Run of Muddlety Creek, 0.7 mile S. 76° W. of Muddlety; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2130' B. Fallen shut, thickness unknown.

Coal Blossom—No. 172 on Map II.

In road on a short branch of Trout Run of Muddlety Creek; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2120' B. Coal blossom, heavy, thickness unknown.

Charles F. Herold Farm Mine—No. 173 on Map II.

On hillside south of Broken Bridge Run of Muddlety Creek, 0.4 mile N. 70° W. of Muddlety; Lower Kittanning (No. 5 Block) Coal; elevation, 2105' B.

	Ft.	In.
Slate, black.....		
Coal, splinty.....	1'	9"
Slate, black.....	0	3
Coal, splinty.....	1	2
	<hr style="width: 10%; margin: 0 auto;"/>	
Slate, pavement.....		

F. D. Herold Farm Mine—No. 174 on Map II.

On hillside south of Enoch Branch of Muddlety Creek, 1.0 mile N. 7° E. of Muddlety; Lower Kittanning (No. 5 Block) Coal; elevation, 2110' B.

	Ft.	In.
Slate, black.....		
Coal, splint.....	2'	0"
Coal, bony.....	0	1
Coal, splint.....	1	8
	<hr style="width: 10%; margin: 0 auto;"/>	
Slate, pavement.....		

H. A. McClung Prospect—No. 175 on Map II.

On hillside south of McMillion Creek, 1.5 miles east of Muddlety; Lower Kittanning (No. 5 Block) Coal; elevation, 2390' B.; observation by Price.

	Ft.	In.
Coal, cannel, reported.....	2'	0"
Coal, reported.....	2	0
	<hr style="width: 10%; margin: 0 auto;"/>	

Coal Blossom—No. 176 on Map II.

On hillside east of Muddlety Creek, 2.1 miles N. 64° E. of Muddlety; Lower Kittanning (No. 5 Block) Coal; elevation, 2275' B.
Coal blossom, thickness unknown.

K. B. McCue Coal Blossom—No. 177 on Map II.

On hillside north of McMillion Creek, 2.2 miles N. 68° E. of Muddlety; Lower Kittanning (No. 5 Block) Coal; elevation, 2285' B.

	Ft.	In.
Coal blossom, visible.....	2	0

Coal Blossom—No. 178 on Map II.

On hillside north of McMillion Creek, 2.5 miles N. 67° E. of Muddlety; Lower Kittanning (No. 5 Block) Coal; elevation, 2280' B.
Coal blossom, thickness unknown.

R. M. Duffy Farm Mine—No. 179 on Map II.

On north side of Enoch Branch of Muddlety Creek, 1.3 miles N. 22° E. of Muddlety; Lower Kittanning (No. 5 Block) Coal; elevation, 2170' B.

	Ft.	In.
1. Slate, black.....		
2. Coal, medium-soft.....	0' 9	"
3. Slate, dark.....	0	1
4. Coal, hard, splinty.....	0	5½
5. Bone	0	0½
6. Coal, splinty.....	0	11
7. Bone	0	1
8. Coal, hard, splinty.....	1 8	..... 4 0
9. Slate, pavement.....		

A sample (No. 259R) was collected from Nos. 2, 4, 6, and 8 of section, the composition of which is published under Mine No. 179 in the Survey Table of Coal Analyses at the end of this Chapter.

L. M. Atwood Farm Mine—No. 180 on Map II.

On hillside north of Lower Spruce Run of Brushy Fork of Muddlety Creek, 1.3 miles N. 31° W. of Hookersville; Lower Kittanning (No. 5 Block) Coal; elevation, 2000' B.

	Ft.	In.
Shale, dark, sandy.....	5	0
Coal	0' 9"	
Slate, black.....	0	6
Coal	1	2
Slate, bony.....	0	9
Coal	1	2
Slate	0	2
Coal	0 3	..... 4 9
Slate, pavement.....		

McQueen Brothers Farm Mine—No. 181 on Map II.

On east side of Spruce Run of Brushy Fork of Muddlety Creek, 1.4 miles N. 14° E. of Hookersville; Lower Kittanning (No. 5 Block) Coal; elevation, 2120' B.

	Ft.	In.
1. Slate, black.....	2	0
2. Coal, with streaks of slate.....	1' 9"	
3. Slate, gray.....	0	2
4. Coal, splint.....	1	6
5. Niggerhead	0	3½
6. Coal, splint.....	2	3½
	6	0
7. Slate, pavement.....		

A sample (No. 287R) was collected from Nos. 4 and 6 of section, the composition of which is published under **Mine No. 181** in the Survey Table of Coal Analyses at the end of this Chapter.

Coal Blossom—No. 182 on Map II.

Along Powell Mountain road, 1.4 miles northeast of Hookersville; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2190' L.; for stratigraphic position see Hookersville Section, page 148.

John Hill Farm Mine—No. 183 on Map II.

On hillside south of Muddlety Creek, 1.7 miles east of Hookersville; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2235' B.; observation by Price.

	Ft.	In.
Shale, black, fissile.....		
Coal	0'	5"
Shale	0	1
Coal, very dirty, many ½" shales.....	2	4
	2	10

(Weathered badly, new opening).

The following exposure is reported by Geo. A. Harrison, Engineer for the Tioga Lumber Company:

Hawkins-Kinney Estate Exposure—No. 184 on Map II.

On Crooked Run of Clear Fork of Muddlety Creek, 1.9 miles northeast of Opal; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2182' L.; investigation by Geo. A. Harrison.

	Ft.	In.
Roof		
Coal, cannel	0'	2"
Coal	0	10½
Coal, bony.....	0	6
Coal	3	9
Slate	0	2¾

			Ft.	In.
Coal	1'	2"		
Bone	1	5		
Coal	1	6	9	7¼

Hawkins-Kinney Estate Prospect—No. 185 on Map II.

On east hillside of Clear Fork of Muddlety Creek, 2.4 miles N. 57° E. of Opal; Lower Kittanning (No. 5 Block) Coal; elevation, 2141' L.; observation by Price.

			Ft.	In.
Shale				
Coal, cannel.....	0'	8½"		
Coal, medium-hard.....	0	7		
Coal, bony.....	0	4½		
Coal, bony splint.....	0	3½		
Coal, hard.....	1	4		
Shale	0	6½		
Coal	1	1		
Shale	0	0¼		
Coal	0	2		
Shale	0	3½		
Coal	0	1½		
Shale	0	0½		
Coal, medium-hard.....	1	0		
Coal, bony splint.....	0	3		
Shale, dark.....	0	4		
Coal, hard.....	2	6		
Shale, dark.....	1	7		
Coal, soft.....	0	10		
Shale, dark.....	0	3½		
Coal, soft.....	0	2½		
Shale, dark.....	0	1½		
Coal, soft.....	0	5		
Coal, hard.....	0	1		
Coal, soft.....	0	7½		
Coal, bony splint.....	0	1½		
Coal, hard.....	2	9½		
Shale, dark.....	0	1½		
Coal, bony	0	2	17	0¼
Interval to Clarion Coal (See Prospect No. 227 on Map II).....			1	8

A sample of the Lower Kittanning was cut from this opening by Mr. Harrison, its composition being published under Mine No. 185 in the Tioga Lumber Company Table of Coal Analyses at the end of this Chapter.

The three following exposures and openings are reported by Geo. A. Harrison, Engineer for the Tioga Lumber Company:

Hawkins-Kinney Estate Exposure—No. 186 on Map II.

On Laurel Fork of Muddlety Creek, 2.3 miles southeast of Opal; Lower Kittanning (No. 5 Block) Coal; elevation, 2278' L.; observation by Geo. A. Harrison.

		Ft.	In.
Roof			
Coal	0' 4"		
Bone	0 3½		
Coal	4 10		
Slate	0 10¾		
Coal	1 7	7	11¼

Tioga Lumber Company Prospect—No. 187 on Map II.

On Slide Branch of Harris Fork of Muddlety Creek, 3.4 miles east of Opal; Lower Kittanning (No. 5 Block) Coal; elevation, 2335' B.; observation by Geo. A. Harrison.

		Ft.	In.
Coal	2' 4"		
Clay	1 1		
Coal	1 7		
Bony (coal?)	0 6¼		
Coal	3 2¼	8	8½
Slate			

Tioga Lumber Company Prospect—No. 188 on Map II.

On Slide Branch of Harris Fork of Muddlety Creek, 3.5 miles east of Opal; Lower Kittanning (No. 5 Block) and Clarion Coals; observation by Geo. A. Harrison.

		Ft.	In.
Coal	0' 4"		
Coal, bony	0 4		
Coal	5 4½	6	0½
Clay, coal and bone to Clarion Coal (See Prospect No. 231 on Map II)		1	5

Tioga Lumber Company Prospect—No. 189 on Map II.

On hillside west of Muddlety Creek, 2.6 miles east of Opal; Lower Kittanning (No. 5 Block) Coal; elevation, 2235' L.; observation by Price.

		Ft.	In.
Shale			
Coal	0' 6½"		
Coal, bony splint	0 4½		
Coal	4 8		
Shale	0 6		

		Ft.	In.
Coal, soft	0' 10"		
Coal, hard, splint, (bony?)	1 3		
Shale	0 1		
Coal, hard.....	1 2	9	5
Shale			

A sample was cut from this opening by Mr. Harrison, its composition being published under **Mine No. 189** in the Tioga Lumber Company Table of Coal Analyses at the end of this Chapter.

Tioga Lumber Company Prospect—No. 190 on Map II.

On Lowry Branch of Muddlety Creek, 1.9 miles N. 84° W. of Delphi; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2287' L.; observation by Price.

		Ft.	In.
Shale			
Coal, cannel	0' 4 "		
Bone	0 3½		
Coal, bony	0 2½		
Coal, hard, splint	4 3½		
Shale, dark	0 11½		
Coal, hard	0 5		
Bone	0 1½		
Coal, bony	0 5		
Bone	0 2	7	2½
Shale, pavement			

The analysis of a sample cut from this opening by Mr. Harrison is published under **Mine No. 190** in the Tioga Lumber Company Table of Coal Analyses at the end of this Chapter.

The following opening is reported by Geo. A. Harrison, Engineer for the Tioga Lumber Company:

Tioga Lumber Company Prospect—No. 191 on Map II.

On Norton Branch of Muddlety Creek, 3.3 miles southwest of Tioga; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2234' L.; observation by Geo. A. Harrison.

	Ft.	In.
Coal, (with 1' 1½" of partings)	7	10¾

Tioga Lumber Company, Muddlety Mine—No. 192 on Map II.

On hillside east of Muddlety Creek, 2.3 miles N. 71° W. of Delphi; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2226' L.; observation by Price.

	Ft.	In.
1. Shale		
2. Coal, cannelly	0' 6	"
3. Bone and shale	0	3
4. Coal, hard	2	3
5. Niggerhead	0	1½
6. Coal, hard	1 5½	4 7
<hr style="width: 10%; margin-left: 0;"/>		
7. Shale, and lower bench of coal reported.....		

A sample (No. 7P) was collected from the mining section, the composition of which is published under **Mine No. 192** in the Survey Table of Coal Analyses at the end of this Chapter.

A sample was cut from this opening by Mr. Harrison, also, its composition being published in the Tioga Lumber Company Table of Coal Analyses at the end of this Chapter.

At the above opening coal is mined for use on the logging operations of the Birch Valley Lumber Company.

At the following prospect the coal was only partly exposed where it goes under Muddlety Creek:

Tioga Lumber Company Prospect—No. 193 on Map II.

Along Muddlety Creek, 2.4 miles N. 65° W. of Delphi; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2215' B.; observation by Price.

	Ft.	In.
Sandstone		
Shale, (bony?)	0	5
Coal, weathered	3	7
Concealed		

Lower Kittanning (No. 5 Block) Coal Beaver District.

In Beaver District the Lower Kittanning (No. 5 Block) Coal crops on the waters of Harris Fork of Muddlety Creek and on Beaver Creek and tributaries, its total acreage not being large, as it rises rapidly southeastward, the last exposure being near the top of Cottle Knob. It has been prospected at numerous points, the following openings and exposures having been noted:

Williams Heirs Farm Mine—No. 194 on Map II.

On west side of Cottle Knob, 2.1 miles west of Allingware; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2845' B.; for stratigraphic position and details see Camden-on-Gauley Section, page 153.

Coal Blossom—No. 195 on Map II.

In road on head of Horse Run of Beaver Creek, 1.4 miles south-east of Delphi; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2525' B.

Coal blossom, thickness unknown.

James Wood Farm Mine—No. 196 on Map II.

On hillside south of Left Fork of Beaver Creek, 0.8 mile S. 81° W. of Delphi; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2400' L.; observation by Price.

	Ft.	In.
Shale, gray, argillaceous		
Coal, bony splint..... 0' 1 "		
Coal	4	6
Shale	0	1½
Coal	0	3½
	5	0
Shale, pavement		

The following prospect is reported by Geo. A. Harrison, Engineer for the Tioga Lumber Company:

Tioga Lumber Company Prospect—No. 197 on Map II.

On a branch of Left Fork of Beaver Creek, 1 mile northwest of Delphi; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2270' L.; observation by Geo. A. Harrison.

	Ft.	In.
Coal (with small partings at top and bottom).....	5	7

Andrew McCoy Farm Mine—No. 198 on Map II.

On branch of Left Fork of Beaver Creek, 1.3 miles N. 72° W. of Delphi; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2268' L.; observation by Price.

	Ft.	In.
1. Shale		
2. Coal, cannel, splint	0'	4"
3. Coal, bony cannel.....	0	4
4. Coal, cannel	3	9
5. Coal, reported	1	6
	5	11

A sample (No. 6P) was collected from Nos. 2 and 4 of section, the composition of which is published under **Mine No. 198** in the Survey Table of Coal Analyses at the end of this Chapter. A considerable amount of coal has been mined from this opening for local fuel. Another sample, cut by Mr. Harrison, is published in the Tioga Lumber Company Table at the end of this Chapter.

Walter Henderson Farm Mine—No. 199 on Map II.

On hillside west of Beaver Creek, 2.1 miles S. 35° W. of Tioga; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2342' L.; observation by Price.

		Ft.	In.
Shale, black			
Coal	0' 1½"		
Shale, dark	0 3		
Coal, soft'	4 0	4	4½
Shale, pavement			

Edwin Baber Prospect—No. 200 on Map II.

On south side of Bearpen Fork of Beaver Creek, 0.9 mile northwest of Delphi; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2275' B.; fallen shut, reported as follows:

		Ft.	In.
Coal	2' 0"		
Shale, gray	0 8		
Coal	3 4	6	0

Since field work was completed in the county, a commercial mine has been opened on Bearpen Fork of Beaver Creek, a very complete description of which has been received from Mr. Geo. A. Harrison, Engineer for the Tioga Lumber Company, the substance of which is compiled below:

Tioga Coal Company Mine—No. 201 on Map II.

On Bearpen Fork of Beaver Creek, 1.9 miles southwest of Tioga; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2272' L.; observation by Geo. A. Harrison.

		Ft.	In.
1. Roof, slate			
2. Coal	0' 2 "		
3. Bone	0 3		
4. Coal	3 4½		

		Ft.	In.
5. Slate, white	0' 0 $\frac{3}{4}$ "		
6. Coal	0 3 $\frac{1}{2}$		
7. Shale, bony	0 1 $\frac{1}{4}$		
8. Coal	0 3 $\frac{1}{4}$	4	6 $\frac{1}{4}$
9. Fire clay, pavement			

"Principal office, Tioga; operated under lease from Walter Henson; daily capacity, 300 tons; 25 men employed; coal shipped to Richmond, W. Va., for steam fuel; greatest rise, southeast; sample collected from Nos. 2 and 4 of section by Geo. A. Harrison, in left room off Second Heading, 300 feet from nearest outcrop."

Duplicate samples were taken by Mr. Harrison at the above opening, one of which was analyzed by Perry Barker of Boston, Mass., for the Tioga Lumber Company, and the other by Mr. Krak for the Survey, the results being as follows.

	Tioga Analysis.	Survey Analysis.
	Per cent.	Per cent.
Moisture	1.08	1.02
Volatile Matter.....	33.08	34.98
Fixed Carbon.....	59.02	56.62
Ash	6.82	7.38
Total	100.00	100.00
Sulphur	0.71	0.55
Phosphorus		0.006
B. T. U.....	13,802	.....

The results reveal a steam or coking coal of great excellence and justify the previous statement of the writer that future mining operations in the Lower Kittanning (No. 5 Block) Coal in this portion of the county should prove highly profitable. Plate XXI shows a photograph made by Mr. Harrison of the working face in this mine.

Scott McQueen Farm Mine—No. 202 on Map II.

On hillside west of Bearpen Fork of Beaver Creek, 1.4 miles N. 34° W. of Delphi; Lower Kittanning (No. 5 Block) Coal; elevation, 2273' L.; observation by Price.

		Ft.	In.
Shale			
Coal, hard, splint.....	3' 10"		
Shale, soft.....	0 1		
Coal	0 3	4	2
Shale, pavement.....			

The two following openings are reported by Geo. A. Harrison, Engineer for the Tioga Lumber Company:

Tioga Lumber Company, Bearpen Mine—No. 203 on Map II.

On Bearpen Fork of Beaver Creek, 1.7 miles southwest of Tioga; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2267' L.; observation by Geo. A. Harrison.

	Ft.	In.
Coal (3" parting near top)	3	7¼

Tioga Lumber Company Prospect—No. 204 on Map II.

On Bearpen Fork of Beaver Creek, 1.7 miles southwest of Tioga; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2260' L.; observation by Geo. A. Harrison.

	Ft.	In.
Coal (2¼" parting)	3	9¼

Tioga Lumber Company Prospect—No. 205 on Map II.

On hillside north of Bearpen Fork of Beaver Creek, 1.9 miles N. 24° W. of Delphi; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2254' L.; observation by Price.

	Ft.	In.
Shale		
Coal	0' 3"	
Shale	0	0½
Coal, splint.	0	3
Coal, hard.	3	8½
	4	3

Tioga Lumber Company Prospect—No. 206 on Map II.

On east side of Beaver Creek, 0.8 mile southwest of Tioga; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2245' B.

	Ft.	In.
Sandstone, massive		
Shale, dark, ferruginous	5	0
Coal	0' 4"	
Bone	0	4
Coal, splinty	2	10
Coal, bony	0	6
	4	0
Slate, pavement		

Since field work was completed in the county, a mine has been opened on the lands of Mrs. E. C. Baber near Tioga by the Bear Run Coal Company, of Tioga, W. Va., of which

Mr. G. R. O'Connor is President and Mr. F. W. Collins is Secretary-Treasurer, the following data, rearranged in standard form, having been submitted to the Survey:

Bear Run Coal Company Mine—No. 206A on Map II.

On south side of Walnut Fork of Beaver Creek, 1000' (0.2 mile) southeast of Tioga Post-office; Lower Kittanning (No. 5 Block) Coal; elevation, not supplied.

			Ft.	In.
Coal, hard.....	1' 0 "			
Bone	0 1½			
Coal, hard.....	2 3			
Slate	0 0¼			
Coal, soft.....	0 4	.....	3	8¾

A sample supplied by the company, and presumably cut from the mining section of the coal, was analyzed by the Survey, the result being as follows:

	Per cent.
Moisture	1.42
Volatile Matter.....	37.96
Fixed Carbon.....	53.54
Ash	7.08
Total	100.00
Sulphur	0.99
Phosphorus	0.004

Although the elevation was not supplied, it seems fairly certain that the above seam correlates with the Lower Kittanning (No. 5 Block) Coal, as both its section and analysis agree with data secured at numerous other openings in the same vicinity. The Middle Kittanning Coal which outcrops in the same hillside would have a much higher ash content.

Tioga Lumber Company Prospect—No. 207 on Map II.

On hillside south of Lower Laurel Run of Beaver Creek, 1.2 miles S. 83° W. of Tioga; Lower Kittanning (No. 5 Block) Coal; elevation, 2229' L.; observation by Price.

		Ft.	In.
Shale			
Coal, medium-hard.....	0' 3 "		
Shale	0 4		
Coal, hard, (one sulphur band).....	2 4½		
Shale	0 0¼		

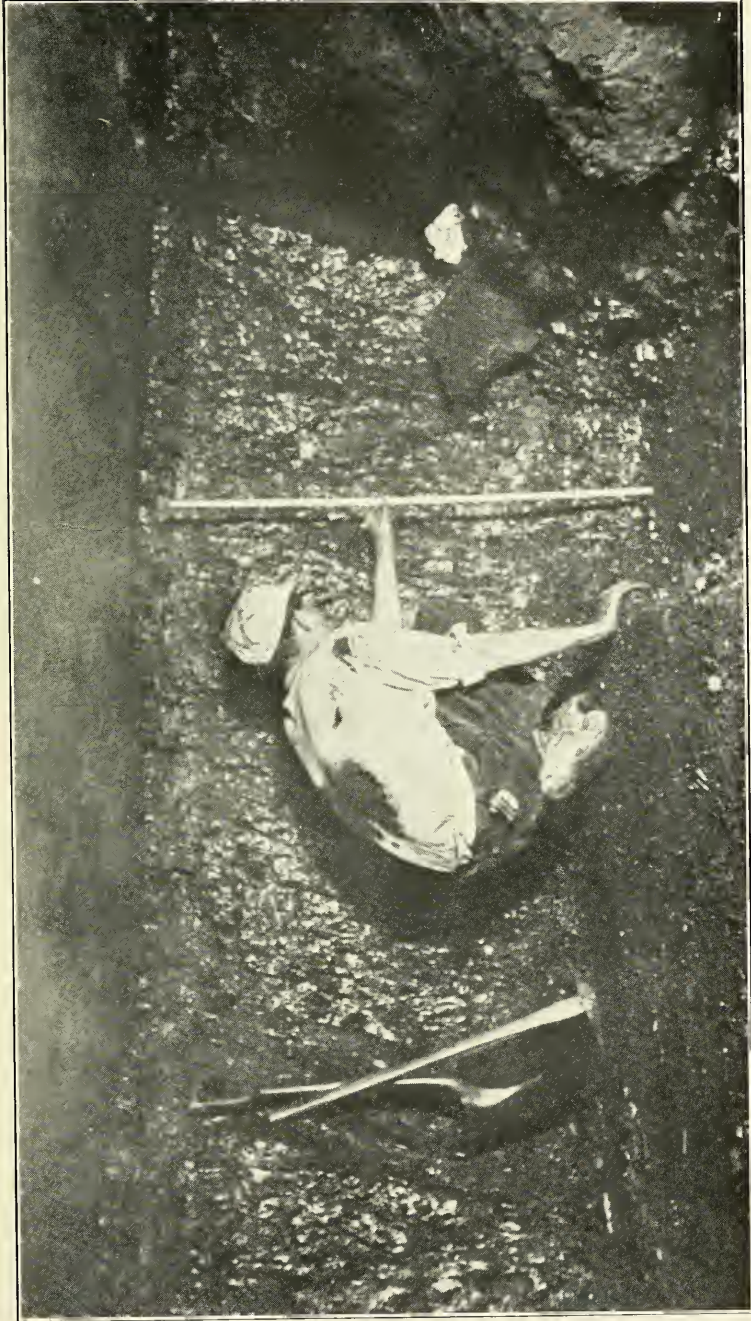


PLATE XXI. — Lower Kittanning (No. 5 Block) Coal at Tioga Coal Company Mine (No. 201 on Map II), 2 miles southwest of Tioga; four-foot rule stands at base.

Photo by Geo. A. Harrison,

		Ft.	In.
Coal, hard	0' 4½"		
Shale	0 2½		
Coal	0 1½	3	8¼
Shale			

Tioga Lumber Company Prospect—No. 208 on Map II.

On north hillside of Walnut Fork of Beaver Creek, 0.2 mile north-west of Tioga; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2293' L.

	Ft.	In.
Coal, (with 2 bone partings), reported.....	3	6

Tioga Lumber Company Prospect—No. 209 on Map II.

On hillside west of Beaver Creek, 0.8 mile west of Tioga; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2245' L.; observation by Price.

Fallen shut, thickness unknown.

J. H. Frazier Farm Mine—No. 210 on Map II.

On south side of Board Fork of Beaver Creek, 0.2 mile northeast of Tioga; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2365' B.

		Ft.	In.
Slate, dark.....			
Coal, medium-hard.....	2' 2"		
Bone	0 3		
Coal, hard.....	1 7	4	0
Slate, pavement.....			

J. H. Frazier Farm Mine—No. 211 on Map II.

On south side of Board Fork of Beaver Creek, 0.3 mile northeast of Tioga; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2370' B.

Fallen shut, thickness unknown.

Tioga Lumber Company, Bussey Mine—No. 212 on Map II.

On south side of Beaver Creek, 0.9 mile north of Tioga; **Lower Kittanning (No. 5 Block) Coal**; elevation, 2257' L.; abandoned and partly fallen shut.

		Ft.	In.
Shale, dark.....			
Coal	0' 6"		
Bone	0 1		
Coal	0 4		
Bone	0 3		
Coal, visible.....	1 6	2	8

Quantity of Lower Kittanning (No. 5 Block) Coal Available.

The following table, compiled by Tucker from a planimetric measurement of the outcrop of the coal on Map II, shows the probable amount of Lower Kittanning (No. 5 Block) Coal by districts in the county:

Probable Amount of Lower Kittanning (No. 5 Block) Coal.

District	Thickness of Coal Assumed. Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Jefferson	4	14.95	9,568	1,667,128,320	66,685,133
Grant	4	5.70	3,648	635,627,520	25,425,101
Summersville	4	15.25	9,760	1,700,582,400	68,023,296
Hamilton	4	80.70	51,648	8,999,147,620	359,965,901
Beaver	4	5.25	3,360	585,446,400	23,417,856
Totals .....	.....	121.85	77,984	13,587,932,160	543,517,287

CLARION COAL.

The Clarion Coal, previously discussed in Chapter V, page 201, occurs in commercial quantity in portions of Hamilton and Beaver Districts, its thickness varying from 2 to 5 feet. It is usually multiple bedded, with both splinty and gaseous layers, divided by one or more streaks of slate or bone. In quality it is high in volatile matter, low in sulphur and phosphorus, and fairly low in ash. It has been used for local domestic fuel in the region of its best development and is being mined commercially on a small scale in Beaver District. Its position in the stratigraphic column varies from 10 to 40 feet below the Lower Kittanning (No. 5 Block) Coal and from 5 to 15 feet above the top of the Homewood Sandstone, both of which horizons are delineated on Map II, from which its location at any point may be closely approximated. Figure 9 shows its supposed minable area, the following openings and exposures having been noted:

Clarion Coal, Jefferson, Grant, and Summersville Districts

In Jefferson, Grant, and Summersville Districts, the Clarion horizon belongs in the high ridges along the waters of Twentymile and Buffalo Creeks, but apparently has not been prospected, no openings having been noted. It does not seem probable that it has minable thickness in this region, although scattered bodies of it may exist.

Clarion Coal, Hamilton District.

In Hamilton District, the Clarion Coal has been prospected on the waters of Birch River and Muddlety Creek, the following having been noted:

Coal Blossom—No. 213 on Map II.

In road, north side of Shant Branch of Powell Creek, 2.4 miles S. 29° W. of Birch River village; Clarion Coal; elevation, 1665' B.

	Ft.	In.
Shale, black, bony.....		
Coal	0'	8"
Shale, gray.....	0	5
Coal	0	8
Shale, gray.....	1	2
Coal	1	3
Shale, gray.....	0	5
Coal	1	0
	5	7
Slate, pavement.....		

Coal Blossom—No. 214 on Map II.

On Shant Branch of Powell Creek, 2.7 miles southwest of Birch River village; Clarion Coal; elevation, 1695' B.

	Ft.	In.
Shale, sandy.....		
Coal	1'	9"
Slate	0	2½
Coal	1	2
Shale	0	4
Coal	1	3
	4	8½
Shale, pavement.....		

Keggy Tract Prospect—No. 215 on Map II.

On hillside east of Shant Branch of Powell Creek, 2.5 miles S. 27° W. of Birch River village; **Clarion Coal**; elevation, 1695' B.; for stratigraphic position and details see Shant Branch Section, page 141.

C. W. Bowen Farm Mine—No. 216 on Map II.

On hillside south of Mill Creek, 1.6 miles N. 55° E. of Birch River village; **Clarion Coal**; elevation, 1550' B.; observation by Price.

	Ft.	In.
Shale, roof, with niggerheads reported.....		
Coal , reported.....	4	9

The above opening had fallen shut, its thickness being reported by a resident.

Martha Hollingsworth Farm Mine—No. 217 on Map II.

On hillside south of Mill Creek, 1.6 miles N. 55° E. of Birch River **Clarion Coal**; elevation, 1555' B.; observation by Price.

	Ft.	In.
Sandstone, massive.....		
Coal , bony, 0" to.....	1	0
Shale, dark, argillaceous, 0" to.....	2	0
Coal , medium-soft.....	1' 1¼"	
Shale, dark.....	0 0¾	
Coal , medium-soft.....	0 11	
Shale, dark.....	0 3	
Coal	0 8	3 0
Shale, pavement.....		

Coal Exposure—No. 218 on Map II.

On hillside north of Mill Creek, 2.5 miles N. 47° E. of Birch River; **Clarion Coal**; elevation, 1580' B.; observation by Price.

	Ft.	In.
Soil.....		
Coal , (top not seen).....	0' 4"	
Shale, dark.....	0 6	
Coal	0 3	
Shale, brown.....	0 5	
Coal	0 2	1 8
Shale, white.....	2	0

Newman Rose Farm Mine—No. 219 on Map II.

On hillside south of Mill Creek, 2.5 miles N. 53° E. of Birch River village; **Clarion Coal**; elevation, 1550' B.; observation by Price.

		Ft.	In.
Sandstone, massive			
Coal, bony splint.....	0' 2 "		
Coal, hard, splinty	2 7		
Shale, gray	0 6½		
Coal, soft	0 2½	3	6

Tioga Lumber Company Prospect—No. 220 on Map II.

On hillside west of Mudlick Run of Anthony Creek, 2.5 miles S. 58° E. of Birch River village; **Clarion Coal**; elevation, 1840' B.; for stratigraphic position and details, see Mudlick Run of Anthony Section, page 143.

The following prospect is reported by Mr. Geo. A. Harrison, Engineer for the Tioga Lumber Company:

Tioga Lumber Company Prospect—No. 221 on Map II.

On east side of Rockhouse Run of Anthony Creek, 3 miles westward from Tioga; **Clarion Coal**; elevation, 2080' L.; observation by Geo. A. Harrison.

		Ft.	In.
Roof			
Coal	1' 6"		
Bone	0 4		
Coal	2 4	4	2

A sample was cut from the mining section by Mr. Harrison, the composition of which is published under **Mine No. 221** in the Tioga Lumber Company Table of Coal Analyses at the end of this Chapter.

Tioga Lumber Company Prospect—No. 222 on Map II.

On west hillside of Pantherlick Branch of Poplar Creek, 2.6 miles N. 35° W. of Tioga; **Clarion Coal**; elevation, 2005' B.

Fallen shut, not much found?

Coal Prospect—No. 223 on Map II.

On hillside south of an east branch of McMillion Creek, 2.4 miles N. 66° E. of Kirkwood; **Clarion Coal**; elevation, 2435' B.
Fallen shut, thickness unknown.

A. Mack Spencer Prospect—No. 224 on Map II.

On Lower Spruce Run of Brushy Fork of Muddlety Creek, 1.1 miles N. 48° W. of Hookersville; **Clarion Coal**; elevation, 1970' B.
Fallen shut, thickness unknown.

O. C. Lewis et al. Prospect—No. 225 on Map II.

On a north branch of Muddlety Creek, 0.7 mile N. 30° E. of Opal; **Clarion Coal**; elevation, 2290' B.; observation by Price.

	Ft.	In.
1. Sandstone, massive, great cliff.....		
2. Shale, bony splint	1	0
3. Coal, soft.....	0'	9½"
4. Bone	0	1½
5. Coal, soft	0	3
6. Bone and sulphur	0	0½
7. Coal, hard, splinty	1	3½
8. Niggerhead	0	0½
9. Coal, hard, splinty	0	4
10. Shale	2	10½

A sample (No. 17P) was collected from Nos. 3, 5, 7, and 9 of section, the composition of which is published under **Mine No. 225** in the Survey Table of Coal Analyses at the end of this Chapter.

Hawkins-Kinney Estate Prospect—No. 226 on Map II.

On hillside west of Clear Fork of Muddlety Creek, 2.1 miles N. 60° E. of Opal; **Clarion Coal**; elevation, 2102' L.; observation by Price.

	Ft.	In.
Sandstone, white, hard, medium-grained.....	10	6
Clay shale, sandy	2	0
Coal	0'	3"
Shale, black	0	1
Coal, soft	0	4
Shale, dark	0	1
Coal, soft	0	9

Shale, dark, limestone nodules

Hawkins-Kinney Estate Prospect—No. 227 on Map II.

On hillside east of Clear Fork of Muddlety Creek, 2.4 miles N. 41° E. of Opal; Clarion Coal; elevation, 2137' L.; observation by Price.

	Ft.	In.
1. Sandstone	0	8
2. Clay shale, sandy	0	5
3. Limestone and pyrite lens	0	3
4. Coal, splint.....	0' 7 "	
5. Coal, bony splint.....	0 6½	
6. Shale, soft	0 1	
7. Coal, splint.....	1 0	2 2½
8. Shale, gray, argillaceous		

At the above opening Nos. 1, 2, and 3 of section constitute the only parting that remains between the Clarion and Lower Kittanning (No. 5 Block) Coals, the usual interval of 10 to 40 feet having almost entirely disappeared. For the section of the Lower Kittanning at this point see Prospect No. 185, page 488.

The analysis of a sample cut partly from the mining section of the Clarion and partly from the Lower Kittanning by Geo. A. Harrison is published in the Tioga Lumber Company Table of Coal Analyses at the end of this Chapter under **Mine No. 227.**

The following prospect is reported by Geo. A. Harrison, Engineer for the Tioga Lumber Company:

Kinney-Hawkins Estate Prospect—No. 228 on Map II.

On a branch of Laurel Fork of Muddlety Creek, 2.1 miles south-east of Opal; Clarion Coal; elevation, 2253' L.; observation by Geo. A. Harrison.

	Ft.	In.
Slate, roof (with coal above)		
Coal	0' 11 "	
Bone	0 3½	
Coal	2 4	
Bone, shaly	0 4½	
Coal	1 3	
Shale	0 5	
Coal	0 7	6 2

Tioga Lumber Company Prospect—No. 229 on Map II.

On hillside west of Muddlety Creek, 2.5 miles S. 85° W. of Delphi;

Clarion Coal; elevation, 2208' L.; observation by Price.

	Ft.	In.
Sandstone		
Bone	0	1
Shale, soft, gray	1	1
Coal, soft.....	1' 3	"
Bone	0	1½
Coal, hard	2	5½
	<hr/>	
Shale		

A sample was cut from the mining section by Mr. Geo. A. Harrison, Engineer for the Tioga Lumber Company, the composition of which is published under **Mine No. 229** in the Tioga Lumber Company Table of Coal Analyses at the end of this Chapter.

Tioga Lumber Company Prospect—No. 230 on Map II.

On hillside east of Muddlety Creek, 2.3 miles N. 74° W. of Delphi; Clarion Coal; elevation, 2182' L.; observation by Price.

	Ft.	In.
1. Shale		
2. Bony cannel.....	0' 6	"
3. Shale, soft	0	1½
4. Coal, soft	0	3
5. Bone	0	2
6. Coal, soft	1	2
7. Bone	0	1
8. Coal, soft	0	9
	<hr/>	
9. Shale, pavement		

A sample (No. 8P) was collected from Nos. 4, 6, 7, and 8 of section, the composition of which is published under **Mine No. 230** in the Survey Table of Coal Analyses at the end of this Chapter.

The following prospect is reported by Geo. A. Harrison, Engineer for the Tioga Lumber Company:

Tioga Lumber Company Prospect—No. 231 on Map II.

On Slide Branch of Harris Fork of Muddlety Creek, 1.9 miles westward from Delphi; Clarion Coal; observation by Geo. A. Harrison.

	Ft.	In.
Clay, coal, and bone from Lower Kittanning Coal....	1	5
Coal	1' 5	"
Shale	0	5½
Coal	1	10¾
	<hr/>	
		3 9¼

At this point the usual interval between the Lower Kittanning and Clarion Coals has almost entirely disappeared (See Prospect No. 188 on Map II, page 489).

Clarion Coal, Beaver District.

In Beaver District the Clarion Coal has been prospected over a comparatively small acreage on the waters of Beaver Creek, its development in this locality being the best of any in the county. It has been used for local domestic fuel and is being mined commercially on a small scale. The following openings and exposures were noted:

The following exposure is reported by Geo. A. Harrison, Engineer for the Tioga Lumber Company:

Knight Tract Exposure—No. 232 on Map II.

On Left Fork of Beaver Creek, 1.1 miles northwest of Delphi; Clarion Coal; elevation, 2294' L.; observation by Geo. A. Harrison.

		Ft.	In.
Roof			
Coal	0' 10 $\frac{1}{4}$ "		
Slate	0 5		
Coal	0 11		
Slate and bone.....	1 1 $\frac{1}{4}$		
Coal	1 10 $\frac{1}{2}$	5	2

The following prospect is reported by Geo. A. Harrison, Engineer for the Tioga Lumber Company:

W. A. Fulks Prospect—No. 233 on Map II.

On a branch of Left Fork of Beaver Creek, 1.1 miles westward from Delphi; Clarion Coal; elevation, 2288' L.; observation by Geo. A. Harrison.

		Ft.	In.
Roof			
Coal	0' 9 $\frac{3}{4}$ "		
Slate	0 3		
Coal	1 1 $\frac{1}{2}$		
Shale	0 10		
Coal	2 1 $\frac{3}{4}$	5	2

Coal Exposure—No. 234 on Map II.

In branch of Left Fork of Beaver Creek, 1.3 miles N. 75° W. of Delphi; Clarion Coal; elevation, 2245' B.; observation by Price.

		Ft.	In.
Shale and sandstone.....			
Coal	0' 9½"		
Shale, gray, soft.....	0 5½"		
Coal	1 0	2	3
Shale, gray.....			

Edwin Baber Coal Exposure—No. 235 on Map II.

On west side of Beaver Creek, 0.8 mile northwest of Delphi; Clarion Coal; elevation, 2230' B.

Coal, in spring, thickness unknown.

The following opening is reported by Geo. A. Harrison, Engineer for the Tioga Lumber Company:

Scott McQueen Farm Mine—No. 236 on Map II.

On north side of Bearpen Fork of Beaver Creek, 1 mile northwest of Delphi; Clarion Coal; elevation, 2256' L.; observation by Geo. A. Harrison.

		Ft.	In.
Coal	0' 10½"		
Slate	0 1¾"		
Coal	0 10½"		
Shale	0 6"		
Coal	3 1	5	5¾

Since field work was completed in the county, a commercial mine has been opened in the Clarion Coal, data on which have been kindly furnished the Survey by Geo. A. Harrison, Engineer for the Tioga Lumber Company, which, compiled in standard form, are as follows:

Tioga Coal Company Mine—No. 237 on Map II.

On south side of Bearpen Fork of Beaver Creek, 1 mile northwest of Delphi; Clarion Coal; elevation, 2251' L.; observation by Geo. A. Harrison.

		Ft.	In.
Roof			
Coal	0' 9"		
Shale	0 2"		

		Ft.	In.
Coal	0' 9"		
Shale	0 10		
Coal	1 10	4	4
Fire clay floor.....			

"Principal office, Tioga; daily capacity, (September, 1918), 50 tons; 6 men employed; coal shipped to Richwood, W. Va., for steam fuel; greatest rise, southeast; section measured in fourth entry; no sample taken; for analyses of neighboring prospects, see tables at end of this Chapter."

Another measurement made by Mr. Harrison at the mouth of the mine shows a total of 5' 1", the bottom bench of the coal being 2' 9½" and there being an additional shale parting.

Walter Henderson Prospect—No. 238 on Map II.

On hillside south of Bearpen Fork of Beaver Creek, 1.1 miles N. 29° W. of Delphi; **Clarion Coal**; elevation, 2230' L.; observation by Price.

	Ft.	In.
Coal, splinty.....	2	0

Walter Henderson Exposure—No. 239 on Map II.

On Bearpen Fork of Beaver Creek, 1.2 miles N. 29° W. of Delphi; **Clarion Coal**; elevation, 2220' L.; observation by Price.
Coal, in run, thickness unknown.

Walter Henderson Exposure—No. 240 on Map II.

On hillside south of Bearpen Fork of Beaver Creek, 1.4 miles N. 30° W. of Delphi; **Clarion Coal**; elevation, 2225' L.; observation by Price.

		Ft.	In.
Shale			
Coal, bony.....	0' 2"		
Coal	0 11		
Shale, gray, soft.....	1 0		
Coal	1 0		
Bone and concealed.....	1 4		
Coal	0 9	5	2

Bottom concealed in water.....

Balsler Faith Farm Mine—No. 241 on Map II.

On east side of Beaver Creek, 1.1 miles southwest of Tioga; Clarion Coal; elevation, 2256' L.

	Ft.	In.
Shale, gray.....		
Coal, soft	0'	9"
Shale, gray.....	0	2
Coal	0	3
Slate, dark.....	0	2
Coal	0	7
Slate, dark, soft.....	0	5
Coal, splinty.....	3	1
	5	5

Coal Prospect—No. 242 on Map II.

On east side of Beaver Creek, 1 mile southwest of Tioga; Clarion Coal; elevation, 2212' L.

Fallen shut, thickness unknown.

Quantity of Clarion Coal Available.

The following table, compiled by Tucker from a close estimate of the acreage, as limited by Figure 9, shows the probable amount of Clarion Coal by districts in the county:

Probable Amount of Clarion Coal.

District	Thickness of Coal Assumed. Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Hamilton	3	47.00	30,080	3,930,854,400	157,234,176
Beaver	4	6.00	3,840	669,081,600	26,763,264
Totals.....		53.06	33,920	4,599,936,000	183,997,440

MINABLE COALS OF THE KANAWHA GROUP OF THE POTTSVILLE SERIES.

STOCKTON (LOWER MERCER?) COAL.

The Stockton (Lower Mercer?) Coal, previously discussed in Chapter VI, pages 240-1, is found in the ridges of the northern and northwestern portions of the county, next to Webster, Braxton, and Clay Counties, its horizon passing above the tops of the hills a few miles north of Gauley River, and being above them in the central and southern parts of the county. In the region of its occurrence it has been prospected and mined for local domestic fuel at various points. As a rule it is a multiple-bedded seam, varying in thickness from 1 to 5 feet, and being of somewhat irregular occurrence. In quality it is high in volatile matter, low in sulphur and phosphorus, but fairly high in ash, there being layers of both gaseous and splinty coal. Its outcrop is not shown on Map II but its position at any point may be approximated from the Coalburg which is delineated on the map, and above which the Stockton comes by an interval of 60 to 90 feet. Figure 10 shows its areal extent, the line shading being broken to indicate that it will not prove to be minable in some localities.

Stockton (Lower Mercer?) Coal, Jefferson District.

In Jefferson District the Stockton (Lower Mercer?) Coal crops mainly on the waters of Twentymile Creek and to a limited extent in the high ridges north of Gauley River and Little Elk and Peters Creeks, but apparently has been prospected at only a few points, the following exposures and openings having been noted:

Coalbell Coal Company Prospect—No. 264 on Map II.

On hill east of Open Fork of Bells Creek, 0.3 mile southeast of Bentreë; **Stockton (Lower Mercer) Coal**; elevation, 1208' L.; for stratigraphic position, see Bentreë Section, page 108.

Fallen shut, thickness unknown.

Greendale Mining Company Prospect—No. 265 on Map II.

On hillside west of Rockcamp Fork of Twentymile Creek, 0.2 mile west of Greendale; **Stockton (Lower Mercer) Coal**; elevation, 1280' B.

	Ft.	In.
Soil		
Coal	1'	0"
Shale, gray	1	0
Coal	0	4
Sandstone	0	3
Coal, bony	0	6
	3	1
Shale, gray		

**Lackawanna Coal & Lumber Company Prospect—
No. 266 on Map II.**

On hillside south of Twentymile Creek, 1.6 miles N. 79° E. of Vaughan; **Stockton (Lower Mercer) Coal**; elevation, 1460' B.

Little coal on dump, thickness unknown.

Coal Blossom—No. 267 on Map II.

On hillside north of Gauley River, 1.2 miles N. 80° W. of Swiss; **Stockton (Lower Mercer) Coal**; elevation, 1570' B.; for stratigraphic position, see Swiss Section, page 115.

	Ft.	In.
Kanawha Black Flint.....	5	0
Coal blossom, thickness unknown.		



PLATE XXII. — Lower Kittanning (No. 5 Block) Coal at McQueen Brothers Mine (No. 181 on M. & P. II), near Hookersville; two-foot rule stands at base.

Photo. by E. E. Harris.

Stockton (Lower Mercer?) Coal, Grant District.

In Grant District the Stockton (Lower Mercer?) Coal crops on the waters of Twentymile, Leatherwood, and Buffalo Creeks, and to a limited extent on the north side of Peters Creek, but has apparently been prospected at only a few points, its thickness and character being subject to much doubt. The following openings were noted:

Elliott Splint Coal Company Prospect—No. 268 on Map II.

In Henry District, Clay County, on hillside south of Leatherwood Creek, 2.3 miles N. 50° W. of Harriet; **Stockton (Lower Mercer) Coal**; elevation, 1365' B.

Fallen shut, not much found?

At this point the Stockton is only 20 feet above the base of the Coalburg Coal, the usual interval having largely thinned out.

The following prospect is noted by Ray V. Hennen in the Braxton and Clay Report of the Survey, page 702:

Elliott Splint Coal Company Prospect—No. 269 on Map II.

On the north side of Leatherwood Creek, 1.7 miles northwest of Harriet; **Stockton (Lower Mercer) Coal**; elevation, 1320' B.; section by hand-level; observation by Ray V. Hennen.

	Ft.	In.
Kanawha Black Flint, typical.....	5	0
Coal, gas, medium-hard.....	1'	4"
Shale	9	1
Coal, slaty	0	8
Shale, gray, argillaceous	1	6
Coal, bony splint	0	9
Shale, gray, argillaceous.....	6	0
Coal, bony splint (reported by G. W. Williams)	3	6
	22	10
Slate, pavement		

Coal Blossom—No. 270 on Map II.

In road north of Twentymile Creek, 0.7 mile west of Harriet; **Stockton (Lower Mercer) Coal**; elevation, 1500' B.; for stratigraphic position, see Harriet (North) Section, page 120.

Coal blossom, below Flint boulders, thickness unknown.

Stockton (Lower Mercer?) Coal, Summersville District.

In Summersville District the Stockton (Lower Mercer?) Coal crops on the waters of Twentymile, Buffalo, Peters, and Muddlety Creeks, having been prospected at several points and used for local domestic fuel. The following openings were noted:

**Elk River Coal & Lumber Company Prospect—
No. 271 on Map II.**

On Libertybowl Branch of Beech Fork of Lilly Fork, 0.4 mile north of Dade; **Stockton (Lower Mercer) Coal**; elevation, 1640' B.

	Ft.	In.
Slate, black, Kanawha Black Flint.....	5	0
Coal, medium-hard	0	10"
Shale, gray	0	2
Coal, medium-hard	0	9
	<hr style="width: 10%; margin-left: auto; margin-right: 0;"/>	
Slate, pavement	1	9

Slate, pavement

**Elk River Coal & Lumber Company Prospect—
No. 272 on Map II.**

On Libertybowl Branch of Beech Fork of Lilly Fork, 0.4 mile N. 24° E. of Dade; **Stockton (Lower Mercer) Coal**; elevation, 1640' B.

	Ft.	In.
1. Kanawha Black Flint.....	7	0
2. Coal, medium-hard.....	1	1"
3. Shale, gray.....	0	2
4. Coal, medium-hard.....	0	10
	<hr style="width: 10%; margin-left: auto; margin-right: 0;"/>	
5. Slate, pavement.....	2	1

5. Slate, pavement.....

A sample (No. 272R) was collected from Nos. 2 and 4 of section, the composition of which is published under **Mine No. 272** in the Survey Table of Coal Analyses at the end of this Chapter.

Coal Prospect—No. 273 on Map II.

On hillside south of Beech Fork of Lilly Fork, 1.1 miles south-east of Dade; **Stockton (Lower Mercer) Coal**; elevation, 1850' B.; for stratigraphic position see Dade Section, page 130.

	Ft.	In.
Slate, black, with marine fossils, Spirifer, Derbya, etc.,		
Kanawha Black Flint	3	0

		Ft.	In.
Coal, soft	0' 7"		
Shale, gray	0 9		
Coal, hard	1 5	2	9
<hr style="width: 10%; margin-left: auto; margin-right: 0;"/>			
Slate, pavement.....			

Coal Blossom—No. 274 on Map II.

On hillside south of Fockler Branch of Muddlety Creek, 1.7 miles S. 8° W. of Muddlety; **Stockton (Lower Mercer) Coal**; elevation, 2125' B.

Coal blossom, at spring, thickness unknown.

Kinney Estate Prospect—No. 275 on Map II.

In road on north side of Fockler Branch of Muddlety Creek, 2.2 miles west of Muddlety; **Stockton (Lower Mercer) Coal**; elevation, 2055' B.

	Ft.	In.
Coal, reported	0	9

Stockton (Lower Mercer?) Coal, Hamilton District.

In Hamilton District the **Stockton (Lower Mercer?) Coal** crops on the waters of Buffalo and Strange Creeks, Birch River, and Muddlety Creek, and lies under drainage in that portion of Beaver Creek embraced by the district. It has been prospected at numerous points and has been used for local domestic fuel, the following openings having been noted:

**Elk River Coal & Lumber Company Prospect—
No. 276 on Map II.**

On hillside east of Robinson Fork of Buffalo Creek, 3.2 miles northeast of Dade; **Stockton (Lower Mercer) Coal**; elevation, 1390' B.; for stratigraphic position, see Isom Branch Section, page 135.

	Ft.	In.
Coal, reported by William Smith.....	4	0

**Elk River Coal & Lumber Company Prospect—
No. 277 on Map II.**

On hillside north of Ramp Run of Bu'alo Creek, 3.0 miles S. 72° E. of Widen; **Stockton (Lower Mercer) Coal**; elevation, 1465' B.

	Ft.	In.
Slate, black, flinty, with marine fossils, Kanawha		
Black Flint	5	0

		Ft.	In.
Coal, soft.....	1' 2"		
Slate, dark	0' 2"		
Coal	0 2		
Slate, dark	0 3	0	7
Coal, hard, splinty.....	1 7	3	4
Slate, black, hard		0	2
Shale, gray			

John Knabb Prospect—No. 278 on Map II.

On east side of Birch River, 3.3 miles N. 26° W. of Birch River village; **Stockton (Lower Mercer) Coal**; elevation, 1065' B.

		Ft.	In.
Sandstone, massive.....			
Shale, sandy.....		10	0
Shale, black, with numerous marine fossils, Kanawha			
Black Flint		1	6
Coal, splinty.....	0' 6"		
Coal, soft.....	0 6		
Slate, black, bony.....	1 9		
Coal, bony splint.....	0 7		
Coal, medium-soft.....	0 11	4	3
Slate, pavement, and concealed to river.....		10	0

Enterprise Coal Company Prospect—No. 279 on Map II.

On hillside west of Birch River, 2.0 miles N. 50° W. of Birch River village; **Stockton (Lower Mercer) Coal**; elevation, 1105' B.
Fallen shut, thickness unknown.

Joseph Tinnil Coal Prospect—No. 280 on Map II.

On hillside east of Birch River, 0.8 mile N. 25° W. of Birch River village; **Stockton (Lower Mercer) Coal**; elevation, 1360' B.; fallen shut, reported by Joseph Tinnil as follows:

		Ft.	In.
Shale, gray.....			
Coal, slaty, 1' 0" to.....	1' 3"		
Slate, black, 0' 4" to.....	0 6		
Coal, hard, splint.....	1 8	3	5
Slate, pavement.....			

Coal Blossom—No. 281 on Map II.

On hillside south of Birch River, 0.3 mile N. 61° W. of Birch River village; **Stockton (Lower Mercer) Coal**; elevation, 1410' B.; for stratigraphic position, see Birch River Section, page 140.

Coal blossom, thickness unknown.

James W. Hoover Farm Mine—No. 282 on Map II.

On hillside south of Mill Creek, 1.4 miles N. 45° E. of Birch River village; **Stockton (Lower Mercer) Coal**; elevation, 1465' B.; observation by Price.

	Ft.	In.
Fallen shut, coal, reported, (no slate).....	5	0

C. W. Bowen Farm Mine—No. 283 on Map II.

On hillside south of Mill Creek, 1.7 miles N. 52° E. of Birch River village; **Stockton (Lower Mercer) Coal**; elevation, 1440' B.; observation by Price.

	Ft.	In.
Bony shale, roof, reported.....		
Coal , medium-hard to splint, reported about.....	5	0

The above opening had fallen shut, the section being reported by a resident.

Coal Blossom—No. 284 on Map II.

On hillside west of Anthony Creek, 1.2 miles S. 61° E. of Birch River village; **Stockton (Lower Mercer) Coal**; elevation, 1620' B.; for stratigraphic position see Anthony Creek (Mouth) Section, page 142.
Coal blossom, thickness unknown.

Tioga Lumber Company Prospect—No. 285 on Map II.

On Mudlick Run of Anthony Creek, 2.5 miles S. 45° E. of Birch River village; **Stockton (Lower Mercer) Coal**; elevation, 1730' B.; for stratigraphic position and details, see Mudlick Run of Anthony Creek Section, page 143.

Tioga Lumber Company Prospect—No. 286 on Map II.

On hillside west of Anthony Creek, 3.5 miles northwest of Tioga; **Stockton (Lower Mercer) Coal**; elevation, 1890' B.
Fallen shut, thickness unknown.

Tioga Lumber Company Prospect—No. 287 on Map II.

On hillside north of Road Fork of Anthony Creek, 2.5 miles N. 58° W. of Tioga; **Stockton (Lower Mercer) Coal**; elevation, 1940' B.
Fallen shut, thickness unknown.

Tioga Lumber Company Prospect—No. 288 on Map II.

On hillside south of Road Fork of Anthony Creek, 2.6 miles N. 63° W. of Tioga; **Stockton (Lower Mercer) Coal**; elevation, 1950' B. Fallen shut, thickness unknown.

**Craig Tract Farm Mine (Thomas Davis Opening)—
No. 289 on Map II.**

On hillside east of Rose Run of Birch River, 3.4 miles east of Birch River village; **Stockton (Lower Mercer) Coal**; elevation, 1725' B.; observation by Reger and Price.

	Ft.	In.
1. Sandstone, massive.....		
2. Coal, slaty.....	0'	8"
3. Coal, splint.....	1	10
4. Slate, gray, streaks of coal.....	1	7
5. Coal, splint.....	3	0
	7	1
6. Slate, pavement.....		

A sample (No. 245R) was collected from Nos. 3 and 5 of section, the composition of which is published under **Mine No. 289** in the Survey Table of Coal Analyses at the end of this Chapter.

Tioga Lumber Company Prospect—No. 290 on Map II.

On Rich Fork of Birch River, 1.4 miles southward from Skyles; **Stockton (Lower Mercer) Coal**; elevation, 1855' B.

	Ft.	In.
Coal blossom.....		
Shale, sandy.....	5	0
Coal, roof.....	1'	1"
Coal, soft.....	0	6
Coal, hard, splinty.....	0	6
Coal, soft.....	2	0
Coal, splinty.....	1	6
	5	7
Slate, pavement.....		

F. D. Herold Prospect—No. 291 on Map II.

On east side of Enoch Branch of Muddlety Creek, 1.3 miles N. 18° E. of Muddlety village; **Stockton (Lower Mercer) Coal**; elevation, 2015' B.

	Ft.	In.
Sandstone	1	0

		Ft.	In.
Coal	0' 3"		
Shale, gray.....	4 0		
Slate, black.....	0 6		
Coal, soft.....	2 5	7	2
<hr/>			
Slate, pavement (?).....			

G. W. Craig Prospect—No. 292 on Map II.

On hillside south of Muddlety Creek, 1.8 miles N. 67° E. of Muddlety; **Stockton (Lower Mercer) Coal**; elevation, 2125' B.; observation by Price.

		Ft.	In.
Shale, with Naiadites, Kanawha Black Flint			
Coal, hard, reported		2	0
Concealed			

J. H. Craig Farm Mine—No. 293 on Map II.

On hillside west of Muddlety Creek, 1.8 miles N. 51° E. of Muddlety; **Stockton (Lower Mercer) Coal**; elevation, 2020' B.

		Ft.	In.
Coal, soft	0' 5"		
Shale, visible	0 2		
Coal, reported	2 5	3	0
<hr/>			

Coal Prospect—No. 294 on Map II.

On hillside north of Paddy Run of Muddlety Creek, 0.2-mile N. 66° W. of Hookersville; **Stockton (Lower Mercer) Coal**; elevation, 2005' B.; observation by Price.

		Ft.	In.
Shale, black, with marine fossils, Kanawha Black Flint		4	0
Coal, splinty.....	0' 5"		
Shale, soft, dark	0 1		
Coal, medium-hard	0 3	0	9
<hr/>			
Shale, pavement (?)			

L. W. Herold Coal Blossom—No. 295 on Map II.

On hillside east of Brushy Fork of Muddlety Creek, 0.3 mile N. 65° E. of Hookersville; **Stockton (Lower Mercer) Coal**; elevation, 2035' B.; observation by Reger and Price.

Coal blossom, at spring. thickness unknown.

L. W. Herold Prospect—No. 296 on Map II.

On south side of Lower Spruce Run of Brushy Fork of Muddlety

Creek, 0.6 mile north of Hookersville; **Stockton (Lower Mercer) Coal**; elevation, 2015' B.; observation by Reger and Price.

	Ft.	In.
Sandstone, massive .....		..
Shale, gray	0	6
Coal	0' 7"	
Shale, bony	0	4
Coal	0	6
Shale, gray	0	6
Coal, to bottom (?)	1 2	3 1

Geo. A. Herold Farm Mine—No. 297 on Map II.

On hillside south of Lower Spruce Run of Brushy Fork of Muddlety Creek, 0.9 mile N. 25° W. of Hookersville; **Stockton (Lower Mercer) Coal**; elevation, 1935' B.; observation by Reger and Price.

	Ft.	In.
Sandstone, massive		
Coal, medium-soft	0' 5½"	
Shale, bony	0	3½
Coal, soft	0	4
Shale, dark	0	1
Coal, medium-soft	1 10	3 0
Slate, pavement		

L. M. Atwood Farm Mine—No. 298 on Map II.

On hillside south of Lower Spruce Run of Brushy Fork of Muddlety Creek, 1.1 miles N. 30° W. of Hookersville; **Stockton (Lower Mercer) Coal**; elevation, 1890' B.

	Ft.	In.
Sandstone, massive		
Shale, dark, with marine fossils, Kanawha Black		
Flint	1	0
Coal	0' 6"	
Shale, gray	0	3
Coal	0	4
Slate	0	1
Coal, medium-soft	1 9	2 11
Slate, pavement		

Coal Prospect—No. 299 on Map II.

On hillside east of Spruce Run of Brushy Fork of Muddlety Creek, 1.4 miles N. 15° E. of Hookersville; **Stockton (Lower Mercer) Coal**; elevation, 2000' B.

Fallen shut, thickness unknown.

Coal Prospect—No. 300 on Map II.

On hillside east of Spruce Run of Brushy Fork of Muddlety Creek, 1.7 miles N. 10° E. of Hookersville; **Stockton (Lower Mercer) Coal**; elevation, 1930' B.; observation by Reger and Price.

	Ft.	In.
Sandstone, massive		
Coal, thickness concealed.....		

Samuel Spencer Farm Mine—No. 301 on Map II.

On hillside east of Spruce Run of Brushy Fork of Muddlety Creek, 1.8 miles N. 9° E. of Hookersville; **Stockton (Lower Mercer) Coal**; elevation, 1920' B.; observation by Reger and Price.

	Ft.	In.
Sandstone, massive		
Coal	0'	6"
Shale, gray	0	5
Coal, to bottom (?)	1	3
	2	2

Coal Blossom—No. 302 on Map II.

In road on south end of Powell Mountain, 1.3 miles northeast of Hookersville; **Stockton (Lower Mercer) Coal**; elevation, 2041' L.; for stratigraphic position and details, see Hookersville Section, page 148.

J. A. Brock Farm Mine—No. 303 on Map II.

On hillside south of Muddlety Creek, 1.9 miles S. 88° E. of Hookersville; **Stockton (Lower Mercer) Coal**; elevation, 2085' B.; observation by Price.

	Ft.	In.
Fallen shut, coal, reported	3	4

Hawkins-Kinney Estate Exposure—No. 304 on Map II.

On hillside east of Clear Fork of Muddlety Creek, 2.2 miles N. 85° E. of Opal; **Stockton (Lower Mercer) Coal**; elevation, 2030' B.; observation by Price.

	Ft.	In.
Shale		
Coal	0'	9"
Coal, bony	0	4
Coal, hard	0	6½
	1	7½
Shale		

Tioga Lumber Company Exposure—No. 305 on Map II.

On hillside east of Muddlety Creek, 3.0 miles east of Opal; Stockton (Lower Mercer) Coal; elevation, 2095' B.; observation by Price.

	Ft.	In.
Sandstone, dark, argillaceous, makes falls.....	18	0
Coal	1'	3"
Shale	0	11
Coal	0	2
Shale	0	2½
Coal	0	6
Shale	0	2
Coal	0	2
	3	4½
Shale	0	6

Coal Prospect—No. 306 on Map II.

On a short branch of Persinger Creek, 0.7 mile N. 78° E. of Persinger village; Stockton (Lower Mercer) Coal; elevation, 2650' B. Fallen shut, thickness unknown.

A. D. Grose Prospect—No. 307 on Map II.

East of a short branch of Persinger Creek, 1.0 mile N. 79° E. of Persinger village; Stockton (Lower Mercer) Coal; elevation, 2685' B.

	Ft.	In.
Fallen shut, coal, reported more than.....	3	0

Stockton (Lower Mercer?) Coal, Beaver District.

In Beaver District, the Stockton (Lower Mercer?) Coal is found in only the northern portion, mainly on the waters of Beaver Creek, its southeastern limit being in Cottle Knob, beyond which its horizon passes into the air. Only a few prospects have been made in the district, the following having been observed:

Coal Exposure—No. 308 on Map II.

In mountain road west of Sugarcamp Run of Strouds Creek, 1.5 miles southeast of Delphi; Stockton (Lower Mercer) Coal; elevation, 2405' B.

	Ft.	In.
Shale, dark, with Lingulae, Kanawha Black Flint.....	3	0
Coal	0	3
Fire clay shale.....		

J. D. Lambert Coal Stripping—No. 309 on Map II.

In Back Fork of Beaver Creek, 1.5 miles S. 41° W. of Delphi; Stockton (Lower Mercer) Coal; elevation, 2225' B.; observation by Reger and Price.

	Ft.	In.
Shale, black, with abundant marine fossils, Kanawha		
Black Flint, visible.....	1	0
Coal, reported.....	2	0

Coal Blossom—No. 310 on Map II.

In Glade District, Webster County, on north side of Board Fork of Beaver Creek, 1.0 mile N. 60° E. of Tioga; Stockton (Lower Mercer) Coal; elevation, 2250' B.; observation by Reger and Price.

Coal, bony, thickness concealed.

Tioga Lumber Company Prospect—No. 311 on Map II.

On Barnet Run of Birch River, near source, 2.0 miles S. 34° W. of Boggs; Stockton (Lower Mercer) Coal; elevation, 2070' B.; observation by Reger and Price.

	Ft.	In.
Shale, black, with marine fossils, Kanawha Black		
Flint	5	0
Coal	0'	9½"
Shale, gray.....	0	3
Coal	1	6

Shale, gray, pavement (?).....

Quantity of Stockton (Lower Mercer?) Coal Available.

The following table, compiled by Tucker from a close estimate of the acreage as limited by Figure 10, shows the probable amount of Stockton (Lower Mercer?) Coal in the county:

Probable Amount of Stockton (Lower Mercer?) Coal.

District	Thickness of Coal Assumed. Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Jefferson	2	21.85	13,984	1,218,286,080	48,731,443
Grant	2	9.60	6,144	535,265,280	21,410,611
Summersville	2	20.90	13,376	1,165,317,120	46,612,685
Hamilton	2	94.00	60,160	5,241,139,200	209,645,568
Beaver	2	9.75	6,240	543,628,800	21,745,152
Totals.....	.....	156.10	99,904	8,703,636,480	348,145,459

COALBURG COAL.

The Coalburg Coal, previously discussed in Chapter VI, pages 243-4, is found generally in the ridges of the northern and northwestern portions of the county, adjoining Fayette, Clay, and Braxton Counties, its horizon passing above the tops of the ridges a few miles north of Gauley River and being above them in the central and southern portions of the county. In the region of its occurrence it has been widely prospected and proved in many localities, having been mined both for local domestic fuel and for commercial shipment. It is usually multiple-bedded, varying in thickness from 2 to 10 feet. Whenever the latter figure is approached it is generally split into two main benches by a heavy shale parting, two or three feet in thickness, the coal above this parting being largely of the soft, gaseous type and that below being mainly splint. Thin streaks of bone or slate often subdivide the two main benches. It is the lower bench that constitutes the usual mining section. In quality the coal is high in volatile matter, low in sulphur and phosphorus, its ash content varying from low to high. Its outcrop is shown on Map II and Figure 11 shows its areal extent. Owing to the large area over which it is generally present, it may be regarded as a great economic asset to the county.

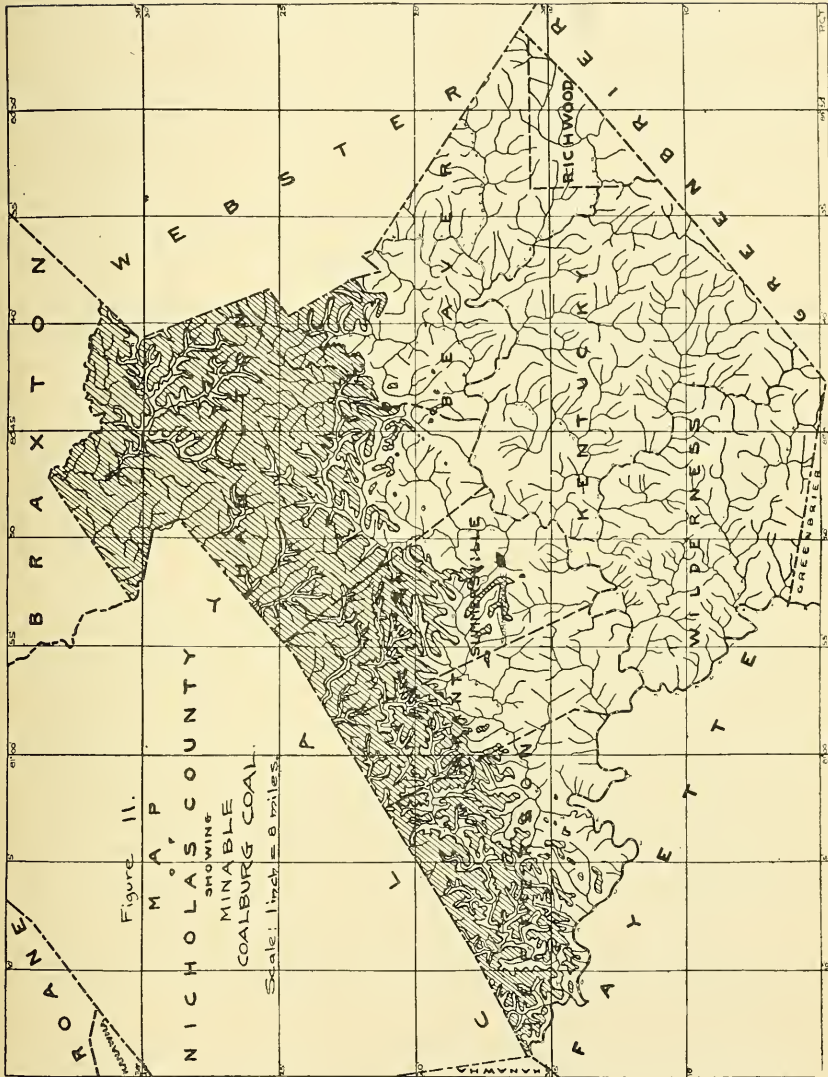


Figure 11

Coalburg Coal, Jefferson District.

In Jefferson District the Coalburg Coal crops on the waters of Twentymile Creek, Sycamore Creek, Gauley River, Little Elk Creek, and Peters Creek. It has been actively mined for many years on the various tributaries of the first-named stream. The following mines and prospects were noted:

Greenbrier Coal Company Mine (Abandoned)— No. 314 on Map II.

On hillside east of Bells Creek, 0.5 mile S. 67° E. of Dixie; **Coalburg Coal**; elevation, 1345' B.; butts, S. 68° W.; faces, S. 22° E.; observation by A. P. Brady.

	Ft.	In.
Sandstone and slate.....		
Coal	0' 6 "	
Slate	0 10	
Splint (coal).....	2 3	
Bone coal.....	0 0¾	
Coal	1 8	
Slate	0 2	
Coal	0 2	5 7¾

The section as given above was measured by A. P. Brady and previously published by I. C. White, in Volume II, page 553, of the Survey Reports, the analysis of which was published on page 554 of the same volume and later republished under No. 10 on page 292 of Bulletin 2 of the Survey, under the name of the **Bell Creek Coal Company**. The same analysis will be found under **Mine No. 314** in the Survey Table of Coal Analyses at the end of this Chapter. This mine has been abandoned for several years.

W. E. Smith Farm Mine—No. 315 on Map II.

On a short branch of Bells Creek, 1.4 miles N. 55° W. of Dixie; **Coalburg Coal**; elevation, 1165' B.

	Ft.	In.
Fallen shut, coal, reported.....	4	0

Coal Prospect—No. 316 on Map II.

On road east of Lick Branch of Open Fork of Bells Creek, 1.7 miles N. 36° E. of Dixie; **Coalburg Coal**; elevation, 1270' B.

Fallen shut, thickness unknown.

**Kentucky Coal & Lumber Company, Cambria Mine
(Abandoned)—No. 317 on Map II.**

On hillside west of Open Fork of Bells Creek, 0.7 mile N. 32° W. of Dixie; **Coalburg Coal**; elevation, 1215' B.; section at mine mouth.

	Ft.	In.
Shale, sandy.....		
Coal	1'	0"
Shale, gray.....	1	0
Coal	0	3
Shale, gray.....	2	0
Coal	0	3
Slate, dark.....	1	3
Coal, slaty.....	0	6
Slate, dark.....	0	10
Coal, splint.....	0	9
Niggerhead	0	1
Coal, splint.....	2	11
	10	10
Slate, pavement.....		

A section once measured by Ray V. Hennen at the working face of the above mine when the same was in operation, as published in Volume II(A), page 460, of the Survey Reports, is as follows:

	Ft.	In.
1. Kanawha Black Flint ledge, typical, exposed.....	4	0
2. Concealed and slate.....	110	0
3. Coal, splint, hard.....	1'	7 "
4. Coal, bony.....	0	0¾
5. Coal, gas.....	0	8
6. Coal, splint.....	1	5
	3	8¾

“Butts, N. 70° E.; faces, S. 20° E.; greatest rise, S. 55° E.”

A sample was collected by Mr. Hennen from Nos. 3, 4, 5, and 6 of section, the composition of which is published under **Mine No. 317** in the Survey Table of Coal Analyses at the end of this Chapter.

**Kentucky Coal & Lumber Company, Mt. Carmel Mine
(Abandoned)—No. 318 on Map II.**

On hillside east of Open Fork of Bells Creek, 0.2 mile east of Cambria; **Coalburg Coal**; elevation, 1215' B.; observation by Ray V. Hennen.

	Ft.	In.
1. Shale and fire clay.....		
2. Coal, soft.....	0	3 "
3. Slate, with streaks of coal.....	1	3

			Ft.	In.
4. Coal, hard, splint.....	1	7		
5. Bony, coal	0	0 $\frac{3}{4}$		
6. Coal, gas	0	6 $\frac{1}{4}$		
7. Coal, splint.....	1	7	5	3

“Butts, N. 70° E.; faces, N. 20° W.; greatest rise, S. 55° E.; sample from Nos. 4, 6, and 7 of section.”

The analysis of the above sample, as collected by Mr. Hennen, is published under **Mine No. 318** in the Survey Table of Coal Analyses at the end of this Chapter, the same having been previously published in Volume II(A), page 466, of the Survey Reports.

Kentucky Coal & Lumber Company, National Mine (Abandoned)—No. 319 on Map II.

On west side of Open Fork of Bells Creek, 0.6 mile northwest of Cambria; **Coalburg Coal**; observation by Ray V. Hennen.

			Ft.	In.
1. Slate and shale.....				
2. Coal, gas.....	0'	4 "		
3. Shale, with streaks of coal.....	0	11		
4. Coal, splint, hard.....	1	8		
5. Coal, bony.....	0	0 $\frac{3}{4}$		
6. Coal, gas.....	0	7		
7. Coal, bony.....	0	0 $\frac{1}{2}$		
8. Coal, splint.....	1	8		
9. Slate, black.....	0	3		
10. Coal, splint.....	0	3	5	9 $\frac{1}{4}$
11. Fire clay.....				

“Elevation (aneroid), 1220' B.; butts, N. 70° W.; faces, S. 20° E.; greatest rise, S. 55° E. Sample from Nos. 4, 5, 6, 7, and 8.”

The analysis of the above sample, as collected by Mr. Hennen, is published under **Mine No. 319** in the Survey Table of Coal Analyses at the end of this Chapter, the same having been previously published in Volume II(A), page 466, of the Survey Reports.

Active mining on a commercial scale is in progress at the two following plants:

Coal Bell Coal Company, Trees Mine—No. 320 on Map II.

On west side of Open Fork of Bells Creek, just southwest of Bentre; **Coalburg Coal**; elevation, 1135' B.; observation by Ray V. Hennen.

	Ft.	In.
1. Sandstone, massive.....		
2. Shale	4	0
3. Slate, with streaks of coal.....	1	2
4. Coal, hard, splint.....	1' 5½"	
5. Bone	0	1
6. Coal, gas.....	0	7
7. Bone	0	1½
8. Coal, splint.....	1	4
9. Shale, black.....	0	2
10. Coal, gas	0 6	4 3
11. Slate		

"Principal office, Bentre; daily capacity, 450 tons; daily output, 200 tons; 22 miners and 22 laborers employed; electric haulage; coal shipped to Great Lakes and inland west for domestic fuel; butts, N. 80° W.; faces, S. 10° E.; greatest rise, S. 50° E.; T. W. Tingley, Assistant General Manager, authority for mine data; sample from Nos. 4, 6, 8, and 10."

The composition of the above sample, as collected by Mr. Hennen, is published under **Mine No. 320** in the Survey Table of Coal Analyses at the end of this Chapter, the same having been previously published in Volume II(A), page 466, of the Survey Reports under the title of "Arminius Coal Company." Mine data are revised to September, 1917.

Coal Bell Coal Company, Flinn Mine—No. 321 on Map II.

On east side of Open Fork of Bells Creek, just east of Bentre; **Coalburg Coal**; elevation, 1140' B.; observation by Ray V. Hennen.

	Ft.	In.
1. Kanawha Black Flint, typical, exposed.....	6	0
2. Slate, black, and concealed.....	4	0
3. Coal, Stockton, splint, clean.....	3	0
4. Concealed	80	0
5. Shale, with streaks of coal, 0' 8" to.....	1	0
6. Coal, splint.....	1' 7½"	
7. Bone	0	0½
8. Coal, gas.....	0	8
9. Coal, splint.....	1	4
10. Fire clay, soft, gray.....	0	8
11. Coal, gas, hard.....	0 10	5 2

"Principal office, Bintree; daily capacity, 500 tons; daily output, 300 tons; 34 miners and 22 laborers employed; electric haulage; coal shipped to Great Lakes and inland west for domestic fuel; butts, N. 80° W.; faces, S. 10° E.; greatest rise, S. 50° E.; T. W. Tingley, Assistant General Manager, authority for mine data; sample from Nos. 6, 7, 8, 9, and 11 of section."

The composition of the above sample, as collected by Mr. Hennen, is published under **Mine No. 321** in the Survey Table of Coal Analyses at the end of this Chapter, the same having been previously published in Volume II(A), page 466, of the Survey Reports, under the title "**Carter Coal Company, Carter Mine.**" Mine data are revised to September, 1917.

**Lackawanna Coal & Lumber Company Prospect—
No. 322 on Map II.**

Near head of Dorsey Branch of Twentymile Creek, 1.3 miles N. 78° W. of Swiss; **Coalburg Coal**; elevation, 1480' B.; for stratigraphic position, see Swiss Section, page 115.

	Ft.	In.
Fallen shut, indicated by mine props as 4' 0" to.....	5	0

**Greendale Mining Company Mine (Abandoned)—
No. 323 on Map II.**

On Spring Branch of Rockcamp Fork of Twentymile Creek, 0.7 mile S. 52° W. of Greendale; **Coalburg Coal**; elevation, 1175' B.

	Ft.	In.
Shale, gray		
Coal , splint	3	11
Slate, gray, pavement, visible	2	0

The above opening, formerly operated as a commercial mine, has now been abandoned.

The following is an active commercial mining plant:

Greendale Mining Company Coal Mine—No. 324 on Map II.

On west side of Rockcamp Fork of Twentymile Creek, 0.1 mile south of Greendale; **Coalburg Coal**; elevation, 1165' B.; observation by Ray V. Hennen.

	Ft.	In.
1. Draw slate, 10" to.....	1	0
2. Slate, streaks of coal	0	4
3. Coal , hard, splint	1' 9"	
4. Bone coal	0	1

		Ft.	In.
5. Coal, gas, 4" to.....	0' 6"		
6. Coal, splint	1 0	3	4
7. Slate, soft			

"Butts, N. 45° E., faces, N. 45° W.; greatest rise, S. 40° E.; mine capacity, 120 tons; men employed, 25; coal shipped west for steam and domestic purposes; authority for mine data, J. R. Sharp, Superintendent; sample from Nos. 3, 4, 5, and 6 of section."

At the time of Mr. Hennen's visit the above operation was classified under the name of the **Paint Creek Colliery Company (Raven Mine)**, the analysis of the coal having been published by I. C. White in Volume II(A), Table No. 8, page 466, of the Survey. The same analysis is republished under **Mine No. 324** in the Survey Table of Coal Analyses at the end of this Chapter, being classified under the name of the present corporation.

**Lackawanna Coal & Lumber Company Prospect—
No. 325 on Map II.**

On the head of Lilly Branch of Twentymile Creek, 2.2 miles southeast of Vaughan; **Coalburg Coal**; elevation, 1550' B.

		Ft.	In.
Shale			
Coal, slaty	1' 10"		
Coal, soft	1 0		
Coal, cannel bone	0 4		
Slate, bony	0 4		
Coal	0 4		
Slate, bony	1 0		
Coal, splint	2 3		
Coal, cannel	1 6	8	7
Slate, pavement			

**Lackawanna Coal & Lumber Company Prospect—
No. 326 on Map II.**

On south side of Twentymile Creek, 1.6 miles N. 77° E. of Vaughan; **Coalburg Coal**; elevation, 1430' B.

		Ft.	In.
Fallen shut, coal, reported by S. M. Smith.....		8	0

Coal Blossom—No. 327 on Map II.

On Twomile Branch of Twentymile Creek, 3.5 miles N. 81° E.

of Vaughan; **Coalburg Coal**; elevation, 1545' B.
Coal blossom, thickness unknown.

Lewis Coal & Land Company Prospect—No. 328 on Map II.

On hillside south of Twentymile Creek, 3.6 miles S. 54° W. of Harriet; **Coalburg Coal**; elevation, 1600' B.; for stratigraphic position, see Hardway Branch of Twentymile Section, page 111.

	Ft.	In.
Fallen shut, coal, reported.....	12	0

Coal Blossom—No. 329 on Map II.

On Boardtree Branch of Twentymile Creek, 2.5 miles N. 88° W. of Harriet; **Coalburg Coal**; elevation, 1345' B.
Coal blossom, thickness unknown.

Lackawanna Coal & Lumber Company Prospect— No. 330 on Map II.

On a short branch of Little Elk Creek, 1.2 miles north of Swiss;
Coalburg Coal; elevation, 1510' B.
 Fallen shut, thickness unknown.

Lackawanna Coal & Lumber Company Prospect— No. 331 on Map II.

On a short branch of Little Elk Creek, 1.3 miles north of Swiss;
Coalburg Coal; elevation, 1505' B.
 Fallen shut, reported as follows by Miletus Simms:

	Ft.	In.
Coal (with partings), 6' 0" to.....7' 0"		
Coal, cannel	4	0
	11	0

Lackawanna Coal & Lumber Company Prospect— No. 332 on Map II.

On Coal Hollow of Little Elk Creek, 1.3 miles N. 25° E. of Swiss;
Coalburg Coal; elevation, 1540' B.
 Fallen shut, thickness unknown.

Lackawanna Coal & Lumber Company Prospect— No. 333 on Map II.

On Coal Hollow of Little Elk Creek, 1.4 miles N. 24° E. of Swiss;
Coalburg Coal; elevation, 1540' B.
 Fallen shut, thickness unknown.

Lackawanna Coal & Lumber Company Prospect—
No. 334 on Map II.

On Coal Hollow of Little Elk Creek, 1.5 miles N. 22° E. of Swiss;
Coalburg Coal; elevation, 1540' B.
Fallen shut, thickness unknown.

Lackawanna Coal & Lumber Company Prospect—
No. 335 on Map II.

On Coal Hollow of Little Elk Creek, 1.7 miles N. 24° E. of Swiss;
Coalburg Coal; elevation, 1540' B.
Fallen shut, thickness unknown.

Lackawanna Coal & Lumber Company Prospect—
No. 336 on Map II.

On hillside north of Little Elk Creek, 2.9 miles N. 63° W. of Leck-
wood; Coalburg Coal; elevation, 1830' B.

	Ft.	In.
Shale, dark.....		
Coal, soft, rotten.....	1'	4"
Shale, gray.....	0	5
Coal, good.....	2	0
	<hr/>	
Shale, gray, visible.....	1	0

Lackawanna Coal & Lumber Company Prospect (David
Swartz Opening)—No. 337 on Map II.

On a short branch of Laurel Creek, 3.3 miles N. 83° E. of Swiss;
Coalburg Coal; elevation, 2110' B.

	Ft.	In.
1. Sandstone, massive, Upper Coalburg.....	20	0
2. Coal, splinty.....	3'	3"
3. Niggerhead.....	0	3
4. Coal, splinty.....	1	1
	<hr/>	
5. Slate, pavement.....	4	7

A sample (No. 309R) was collected from Nos. 2 and 4 of section, the composition of which is published under **Mine No. 337** in the Survey Table of Coal Analyses at the end of this Chapter.

John Summers Prospect—No. 338 on Map II.

On hillside south of Otter Creek, 2.2 miles N. 76° W. of Lockwood;
Coalburg Coal; elevation, 1930' B.

	Ft.	In.
1. Sandstone, massive.....		
2. Shale, dark.....	3	0
3. Coal, soft.....	0	10"
4. Slate, dark.....	0	2
5. Coal, soft.....	0	3
6. Coal, splinty.....	3	3
7. Bone.....	0	3
8. Coal, soft.....	0	4
9. Slate, gray.....	0	2
10. Coal, soft.....	0	3
	5	6
11. Slate, pavement.....		

A sample (No. 302R) was collected from Nos. 3, 5, 6, and 8 of section, the composition of which is published under Mine No. 338 in the Survey Table of Coal Analyses at the end of this Chapter.

C. C. Sharp Prospect—No. 339 on Map II.

On Right Fork of Line Creek, 3.0 miles N. 25° E. of Lockwood;
Coalburg Coal; elevation, 1650' B.

	Ft.	In.
1. Sandstone.....		
2. Coal, streaks.....		
3. Sandy shale and sandstone.....	5	0
4. Shale, gray.....	1	0
5. Coal, soft.....	0	8"
6. Niggerhead.....	0	3
7. Coal, soft.....	0	7
8. Coal, splint.....	0	6
9. Coal, soft.....	0	7
10. Coal, splint.....	1	9
11. Coal, soft.....	0	8
	5	0
12. Slate, pavement.....		

A sample (No. 310R) was collected from Nos. 5, 7, 8, 9, 10, and 11 of section, the composition of which is published under Mine No. 339 in the Survey Table of Coal Analyses at the end of this Chapter.

Coalburg Coal, Grant District.

In Grant District the Coalburg Coal outcrops on the waters of Twentymile, Leatherwood, and Peters Creeks. Enough prospects have been made to indicate its general prevalence, but it has not been mined at all for commercial shipment and only to a slight extent for local domestic use. The following exposures and prospects were noted:

Elliott Splint Coal Company Prospect—No. 340 on Map II.

In Henry District, Clay County, on hillside south of Leatherwood Creek, 2.2 miles N. 51° W. of Harriet; **Coalburg Coal**; elevation, 1345' B.

	Ft.	In.
Concealed and slate, black, from Stockton Coal	12	0
Coal , bony.....	0	7"
Coal , medium-hard.....	1	2
Slate, dark.....	0	2
Coal , splint.....	2	2
Slate, bony.....	0	11
Coal , splint.....	2	2
Coal , bony.....	0	8
	7	10
Slate, pavement.....		

Coal Blossom—No. 341 on Map II.

In road north of Twentymile Creek, 0.7 mile west of Harriet; **Coalburg Coal**; elevation, 1425' B.; for stratigraphic position see Harriet—North Section, page 120.

Coal blossom, thickness unknown.

C. C. Wood Farm Mine—No. 342 on Map II.

On north side of Spruce Run of Twentymile Creek, 1.0 mile S. 71° E. of Harriet; **Coalburg Coal**; elevation, 1665' B.

Fallen shut, thickness unknown.

Coal Exposure—No. 343 on Map II.

On hillside south of Twentymile Creek, 1.1 miles N. 69° E. of Harriet; **Coalburg Coal**; elevation, 1565' B.

	Ft.	In.
Coal , slaty, visible.....	1	0

Lewis Coal & Land Company Prospect—No. 344 on Map II.

On hillside south of Twentymile Creek, 1.7 miles N. 78° E. of Harriet; Coalburg Coal; elevation, 1610' B.

	Ft.	In.
Slate, black	6	0
Coal, soft	0'	5"
Slate, black	0	7
Coal, soft	0	8
Slate, black	0	4
Coal, bony	0	5
Coal, splint	2	0
Slate, dark	0	2
Coal, soft	0	5
	5	0
Coal, splint, concealed.....		
Water and mud		

Lewis Coal & Land Company Farm Mine (Taylor Brothers Opening)—No. 345 on Map II.

On a short branch of Robinson Fork of Twentymile Creek, 1.0 mile S. 30° E. of Harriet; Coalburg Coal; elevation, 1670' B.

	Ft.	In.
Fallen shut, coal, with partings, reported.....	7	0

Robert Underwood Farm Mine—No. 346 on Map II.

Near head of Robinson Fork of Twentymile Creek, 1.8 miles S. 48° W. of Harriet; Coalburg Coal; elevation, 1775' B.

	Ft.	In.
Slate, black, bony.....	1	0
Coal, splint	2'	0"
Coal, soft	0	5
Coal, splint	0	10
Niggerhead	0	3
Coal, splint	0	7
Coal, medium-hard	1	0
	5	1
Shale, gray, pavement		

George Rader Farm Mine—No. 347 on Map II.

Near head of Robinson Fork of Twentymile Creek, 2.0 miles N. 66° W. of Gilboa; Coalburg Coal; elevation, 1905' B.

	Ft.	In.
1. Slate, black		
2. Coal, splint	1'	6"
3. Coal, soft	0	7
4. Coal, splint	0	11
5. Bone	0	3
6. Coal, splint	1	5
	4	8

A sample (No. 282R) was collected from Nos. 2, 3, 4, and 6 of section, the composition of which is published under **Mine No. 347** in the Survey Table of Coal Analyses at the end of this Chapter.

Coal Exposure—No. 348 on Map II.

In road at head of Jones Branch of Peters Creek, 1.2 miles N. 46° W. of Gilboa; **Coalburg Coal**; elevation, 2060' B.; for stratigraphic position see Gilboa Section, page 122.

	Ft.	In.
Coal, with partings, about.....	10	0

Coalburg Coal, Summersville District.

In Summersville District the Coalburg Coal outcrops on the waters of Twentymile, Buffalo, Peters, and Muddlety Creeks, where it has been prospected at several points and has been mined for local domestic fuel to a limited extent. The following openings and exposures were noted:

Elk River Coal & Lumber Company Prospect (Reuben McKinney Opening)—No. 349 on Map II.

On a short branch of Twentymile Creek, 1.3 miles S. 45° W. of Dade; **Coalburg Coal**; elevation, 1610' B.

	Ft.	In.
Sandstone, massive.....		
Coal, medium-soft.....	3'	6"
Shale, gray.....	1	0
Coal, reported.....	2	6
	7	0

**Elk River Coal & Lumber Company Farm Mine—
No. 350 on Map II.**

On south side of Libertybowl Branch of Beech Fork of Lilly Fork of Buffalo Creek, 0.5 mile S. 70° W. of Dade; **Coalburg Coal**; elevation, 1520' B.

	Ft.	In.
1. Slate, dark.....		
2. Coal, hard.....	1'	8"
3. Shale, gray.....	1	10
4. Coal, soft.....	1	0
5. Shale, dark.....	0	4
6. Coal, soft.....	1	0
7. Slate, bony.....	0	9
8. Coal, soft.....	0	11
	7	6
9. Slate, pavement.....		

A sample (No. 271R) was collected from Nos. 2, 4, 6, and 8 of section, the composition of which is published under **Mine No. 350** in the Survey Table of Coal Analyses at the end of this Chapter.

**Elk River Coal & Lumber Company Prospect—
No. 351 on Map II.**

On south side of Libertybowl Branch of Beech Fork of Lilly Fork of Buffalo Creek, 0.4 mile west of Dade; **Coalburg Coal**; elevation, 1505' B.; fallen shut, reported as follows by E. V. Woods:

	Ft.	In.
Sandstone, massive		
Coal, bony	1'	5"
Shale, gray	6	0
Coal, splint	2	0
Shale, gray	0	8
Coal, bony	1	6
Slate, black	0	6
Coal, soft	2	0
Slate, blue	0	8
Coal, soft	2	0
	16	9

**Elk River Coal & Lumber Company Prospect—
No. 352 on Map II.**

On north side of Libertybowl Branch of Beech Fork of Lilly Fork of Buffalo Creek, 0.3 mile N. 55° W. of Dade; **Coalburg Coal**; elevation, 1505' B.

	Ft.	In.
Coal, visible	0'	8"
Coal, reported	2	4
	3	0

Mr. E. V. Woods is authority for the statement that the above prospect measured 3 feet of coal, its product having once been used for smithing.

Coal Blossom—No. 353 on Map II.

On east slope of Lonetree Mountain, 0.9 mile west of Summersville; **Coalburg Coal**; elevation, 2333' B.; for stratigraphic position, see Summersville Section, page 127.

Coal blossom, thickness unknown.

Coal Blossom—No. 354 on Map II.

On hillside west of Muddlety Creek, 1.8 miles south of Muddlety; **Coalburg Coal**; elevation, 2070' B.; for stratigraphic position, see Fockler Branch Section, page 129.

Coal blossom, thickness unknown.

Coalburg Coal, Hamilton District.

In Hamilton District the Coalburg Coal outcrops on the waters of Buffalo Creek, Birch River, and Muddlety Creek, having been prospected at numerous points and having been used for local and domestic fuel in various localities. The following openings were noted:

**Elk River Coal & Lumber Company Exposure—
No. 355 on Map II.**

In Buffalo District, Clay County, on hillside north of Buffalo Creek, at Widen; **Coalburg Coal**; elevation, 1110' B.

	Ft.	In.
Sandstone, shaly, Upper Coalburg		
Shale, dark, with plant fossils, Coalburg	4	0
Coal , slaty	1	10
Slate and concealed to creek.....	5	0

**Elk River Coal & Lumber Company Exposure—
No. 356 on Map II.**

On hillside south of Buffalo Creek, 2.3 miles S. 67° E. of Widen; **Coalburg Coal**; elevation, 1255' B.

	Ft.	In.
Shale, sandy, ferruginous, Coalburg	7	0
Coal	0	5"
Slate, dark	0	11
Coal , (estimated)	1	6
Fire clay and shale, sandy, to creek.....	5	0

Henry Herold Prospect—No. 357 on Map II.

On hillside south of Buffalo Creek, 0.5 mile S. 59° E. of Widen; **Coalburg Coal**; elevation, 1445' B.

	Ft.	In.
1. Sandstone, massive, Upper Coalburg		
2. Shale, dark, lenticular, Coalburg , 0' 0" to.....	0	4
3. Coal , soft.....	0	5"
4. Slate, dark.....	0	4
5. Coal , soft.....	2	3
6. Slate, pavement.....		

A sample (No. 257R) was collected from Nos. 3 and 5 of section, the composition of which is published under **Mine No. 357** in the Survey Table of Coal Analyses at the end of this Chapter.

Coal Auger Boring—No. 358 on Map II.

On hillside east of Birch River, 0.8 mile N. 25° W. of Birch River village; **Coalburg Coal**; elevation, 1335' B.

	Ft.	In.
Coal, in auger hole, reported.....	2	0

Enterprise Coal Company Prospect—No. 359 on Map II.

On Spring Bottom Run of Birch River, 0.8 mile S. 72° W. of Birch River village; **Coalburg Coal**; elevation, 1335' B.

	Ft.	In.
Sandstone, massive, Upper Coalburg	10	0
Coal, medium-soft.....	1'	6"
Coal, bony.....	0	4
Coal, medium-soft.....	1	4
Slate, pavement.....	3	2

Mollie Frame Farm Mine—No. 360 on Map II.

On south side of Birch River, 0.3 mile N. 56° W. of Birch River village; **Coalburg Coal**; elevation, 1320' B.; for stratigraphic position, see Birch River Section, page 140.

	Ft.	In.
1. Sandstone, massive, Upper Coalburg	15	0
2. Shale, black (one marine fossil found), Coalburg Shale	0	3
3. Coal, soft.....	1'	9"
4. Coal, bony.....	0	3
5. Coal, soft.....	1	2
6. Slate, pavement.....		

A sample (No. 253R) was collected from Nos. 3 and 5 of section, the composition of which is published under **Mine No. 360** in the Survey Table of Coal Analyses at the end of this Chapter.

Obbe Tract Farm Mine (Hale McKinney Opening)— No. 361 on Map II.

On hillside south of Little Run of Powell Creek, 1.3 miles S. 5° E.

of Birch River village; **Coalburg Coal**; elevation, 1505' B.; observation by Price.

	Ft.	In.
Sandstone, massive, Upper Coalburg		
Coal	1'	7"
Bony splint.....	0	3
Coal , concealed in water.....	1	5
Coal , reported.....	0	9
	4	0
Dark, sandy shale to run.....	8	0

Hawkins-Kinney Estate Farm Mine—No. 362 on Map II.

On Lick Run of Powell Creek, 2.3 miles S. 87° E. of Birch River village; **Coalburg Coal**; elevation, 1625' B.; observation by Price.

	Ft.	In.
1. Sandstone, massive, Upper Coalburg		
2. Coal , hard, splint.....	0'	4"
3. Coal , bony splint.....	0	1
4. Coal , hard, splint.....	0	11
5. Niggerhead	0	2
6. Coal , hard, splint.....	1	6
	3	0
7. Shale, pavement.....		

A sample (No. 4P) was collected from Nos. 2, 3, 4, and 6 of section, the composition of which is published under **Mine No. 362** in the Survey Table of Coal Analyses at the end of this Chapter.

David Frame Mine—No. 363 on Map II.

On hillside north of Powell Creek, 1.1 miles S. 22° W. of Birch River village; **Coalburg Coal**; elevation, 1460' B.; observation by Price.

	Ft.	In.
Sandstone, Upper Coalburg		
Coal , base concealed by water.....	2	11

Gabriel Robinson Farm Mine—No. 364 on Map II.

On west hillside of Powell Creek, 1.3 miles S. 28° W. of Birch River village; **Coalburg Coal**; elevation, 1490' B.

	Ft.	In.
Sandstone, massive, Upper Coalburg		
Coal , soft.....	1'	9"
Slate, bony.....	0	2
Coal , medium-soft.....	1	2
Shale, dark.....	0	9
Coal	0	4
	4	2
Slate, gray, visible.....	1	0

Dr. J. M. Brockerhoff Farm Mine—No. 365 on Map II.

In road on hillside west of Powell Creek, 2.2 miles S. 28° W. of Birch River village; **Coalburg Coal**; elevation, 1550' B.; for stratigraphic position and details see Shant Branch Section, page 141.

Henry Herold Prospect—No. 366 on Map II.

On hillside east of Powell Creek, 3.2 miles S. 14° W. of Birch River village; **Coalburg Coal**; elevation, 1620' B.

	Ft.	In.
1. Sandstone, massive, Upper Coalburg	40	0
2. Coal , medium-soft.....	1'	3"
3. Coal , bony.	0	2
4. Coal , medium-soft.....	2	0
	<hr style="width: 100px; margin-left: auto; margin-right: 0;"/>	3
5. Slate, pavement.....		5

A sample (No. 252R) was collected from Nos. 2 and 4 of section, the composition of which is published under **Mine No. 366** in the Survey Table of Coal Analyses at the end of this Chapter.

Henry Herold Prospect—No. 367 on Map II.

On east side of Powell Creek, 3.2 miles S. 17° W. of Birch River village; **Coalburg Coal**; elevation, 1640' B.

	Ft.	In.
Sandstone, massive, Upper Coalburg	30	0
Coal , soft.....	1'	6"
Bone	0	2
Coal , medium-soft.....	1	9
	<hr style="width: 100px; margin-left: auto; margin-right: 0;"/>	3
Slate, pavement.....		5

J. W. Hoover and C. W. Bowen Farm Mine— No. 368 on Map II.

On hillside south of Mill Creek, 1.4 miles N. 53° E. of Birch River village; **Coalburg Coal**; elevation, 1430' B.; observation by Price.

	Ft.	In.
Shale		
Coal , medium-hard, some bone.....	0'	8"
Coal , medium-hard, splint.....	0	6
Coal , hard, splint.....	0	6
Coal , medium-hard, splint (bottom in water)	1	7
	<hr style="width: 100px; margin-left: auto; margin-right: 0;"/>	3
		3

S. M. Dodrill Farm Mine—No. 369 on Map II.

On hillside south of Birch River, 1.8 miles S. 75° E. of Birch River village; **Coalburg Coal**; elevation, 1360' B.; observation by Price.

	Ft.	In.
Sandstone, massive, Upper Coalburg		
Coal , hard, splinty.....	1' 10"	
Shale, dark	0 4½	
Coal , hard, splinty	0 8	2 10½
Shale, bottom		

Ballard Scott Farm Mine—No. 370 on Map II.

On hillside west of Anthony Creek, 1.1 miles S. 67° E. of Birch River village; **Coalburg Coal**; elevation, 1550' B.; for stratigraphic position, see Anthony Creek (Mouth) Section, page 142.

	Ft.	In.
1. Shale, sandy		
2. Coal , cannel	2' 11"	
3. Coal , soft	0 4	3 3
4. Slate, pavement		

A sample (No. 247R) was collected from No. 2 of section, the composition of which is published under **Mine No. 370** in the Survey Table of Coal Analyses at the end of this Chapter.

Tioga Lumber Company Farm Mine—No. 371 on Map II.

On hillside east of Anthony Creek, 2.0 miles S. 57° E. of Birch River village; **Coalburg Coal**; elevation, 1675' B.; observation by Reger and Price.

	Ft.	In.
1. Sandstone		
2. Coal , medium-soft	2' 1"	
3. Shale, dark	0 3	
4. Coal , medium-soft	1 2	3 6
5. Shale, pavement		

A sample (No. 2P) was collected from Nos. 2 and 4 of section, the composition of which is published under **Mine No. 371** in the Survey Table of Coal Analyses at the end of this Chapter.

Tioga Lumber Company Prospect—No. 372 on Map II.

On Mudlick Run of Anthony Creek, 2.5 miles S. 54° E. of Birch River village; **Coalburg Coal**; elevation, 1695' B.; for stratigraphic position and details see Mudlick Run of Anthony Creek Section, page 143.

**Tioga Lumber Company Farm Mine (Matthew Justus
Opening)—No. 373 on Map II.**

On hillside south of Anthony Creek, 4.2 miles northwest of Tioga;
Coalburg Coal; elevation, 1755' B.; observation by Reger and Price.

	Ft.	In.
Sandstone, massive		
Shale, dark, plant fossils	2	8
Coal, soft.....	0' 3"	"
Shale, dark	0	9
Coal	0	2
Shale, gray	2	0
Coal, soft	0	11
Shale, 0' 0" to.....	0	1½
Coal, hard, visible.....	2	0
Concealed by water, coal, reported... ..	0 5½	..... 6 8

Tioga Lumber Company Prospect—No. 374 on Map II.

On hillside east of Anthony Creek, 2.6 miles northwest of Tioga;
Coalburg Coal; elevation, 1835' B.

Fallen shut, thickness unknown.

Tioga Lumber Company Prospect—No. 375 on Map II.

On west hillside of Anthony Creek, 3.5 miles northwest of Tioga;
Coalburg Coal; elevation, 1820' B.

Fallen shut, thickness unknown.

Enoch Bays Farm Mine—No. 376 on Map II.

On hillside north of Birch River, 1.8 miles N. 76° E. of Birch River
village; Coalburg Coal; elevation, 1535' B.; observation by Price.

	Ft.	In.
Shale	5	0
Sandstone, massive	1	0
Coal, bony	0' 3½"	"
Shale, black	0	3
Coal, soft	0	3
Shale, black	0	2
Coal	1 4½	..... 2 4
Fire clay, dark, removed in mining.....	4	0

David McQueen Farm Mine—No. 377 on Map II.

On hillside north of a branch of Glade Creek, 1.1 miles S. 73° E.
of Kirkwood; Coalburg Coal; elevation, 2340' B.; observation by Price.



PLATE XXIII. — Middle portion of Coalburg Coal at J. H. Baker Mine (No. 384 on Map II), on McMillion Creek, showing typical Kanawha splint,
Photo by E. E. Harris.

		Ft.	In.
Shale, black			
Bone		0	1
Coal	0' 3"		
Bone	0 3½		
Coal	2 2½		
Bone	0 2		
Coal	0 7		
Shale, gray, soft, with bone streak....	0 9		
Bone	0 2½		
Shale, dark, soft	0 3		
Bone	0 3		
Coal	1 0		
Shale, hard, dark, pyrite.....	0 1½		
Coal, medium-hard	4 0		
Bony splint	0 1		
Coal	0 5	10	7

George and Hudson Tyree Farm Mine—No. 378 on Map II.

On head of Phillips Run of Muddlety Creek, 1.1 miles S. 75° E. of Kirkwood; Coalburg Coal; elevation, 2380' B.; observation by Price.

		Ft.	In.
Shale, gray		3	0
Coal	0' 4"		
Shale, dark, soft	0 3		
Coal	1 1		
Coal, bony splint.....	1 1		
Coal, medium-hard	1 8		
Bone	0 9		
Concealed (probably bone)	0 5		
Concealed in mine tunnel now closed, (coal)	2 0	7	7

H. A. McClung Farm Mine—No. 379 on Map II.

On hillside south of McMillion Creek, 1.6 miles N. 85° E. of Muddlety; Coalburg Coal; elevation, 2135' B.; observation by Price.

		Ft.	In.
Coal, visible 2' 0", reported 3' 0" to.....		4	0

David McQueen Farm Mine—No. 380 on Map II.

On headwaters of a south branch of McMillion Creek, 1.3 miles S. 84° E. of Kirkwood; Coalburg Coal; elevation, 2340' B.; observation by Price.

		Ft.	In.
Coal and shale, visible.....		10	0

A. M. C. Hutchinson Farm Mine—No. 381 on Map II.

On a branch of McMillion Creek, 0.6 mile S. 12° W. of Opal;
Coalburg Coal; elevation, 2210' B.; observation by Price.

	Ft.	In.
1. Sandstone		
2. Shale, black, fossil plants.....	0	8
3. Coal, bony.....	0'	5½"
4. Coal, hard.....	2	5½
5. Shale, soft.....	0	5
6. Coal	0	1
7. Shale, soft.....	0	2
8. Coal	1	0
9. Shale	0	3
10. Coal	1	0
<hr style="width: 10%; margin-left: auto; margin-right: 0;"/>		
11. Concealed	4	6
12. Sandstone, massive.....	1	0

A sample (No. 11P) was collected from No. 4 of section, the composition of which is published under **Mine No. 381** in the Survey Table of Coal Analyses at the end of this Chapter.

Cameron S. Hutchinson Farm Mine—No. 382 on Map II.

North of a branch of McMillion Creek, 0.9 mile S. 8° E. of Opal;
Coalburg Coal; elevation, 2235' B.; observation by Price.

	Ft.	In.
Sandstone, massive, Coalburg		
Shale, soft, Coalburg	0	6
Coal, bony splint.....	0'	3"
Coal, hard.....	3	1
<hr style="width: 10%; margin-left: auto; margin-right: 0;"/>		
Shale		
Coal and shale immediately below, reported.....	4	0

Cameron S. Hutchinson Farm Mine—No. 383 on Map II.

On south side of a branch of McMillion Creek, 2.4 miles N. 64° E. of Kirkwood; **Coalburg Coal**; elevation, 2270' B.; observation by Price.

	Ft.	In.
Roof, sandstone.....		
Coal, soft and hard, not much shale, reported 8' 0" to..	9	0

J. H. Baker Farm Mine—No. 384 on Map II.

On north hillside of McMillion Creek, 1.9 miles northwest of Calvin; **Coalburg Coal**; elevation, 2365' B.; observation by Price.

	Ft.	In.
1. Shale		

			Ft.	In.
2.	Coal, soft, reported.....	4' 5 "		
3.	Coal, soft.....	1 7		
4.	Shale, black.....	0 1½		
5.	Coal	0 2½		
6.	Shale, soft.....	0 4		
7.	Coal, soft.....	1 0		
8.	Shale, soft, light.....	0 4		
9.	Coal, bony.....	0 1½		
10.	Coal, hard.....	4 6		
11.	Shale, gray.....	0 2½		
12.	Coal	0 6		
13.	Shale, gray (plant roots).....	0 10		
14.	Coal, soft, reported.....	3 8	17	10
15.	Sandstone, reported.....			

A sample (No. 12P) was collected from Nos. 9 and 10 of section, the composition of which is published under **Mine No. 384** in the Survey Table of Coal Analyses at the end of this Chapter.

David Brown Farm Mine—No. 385 on Map II.

On hillside west of McMillion Creek, 1.6 miles northwest of Calvin; **Coalburg Coal**; elevation, 2420' B.; observation by Price.

			Ft.	In.
1.	Coal, top concealed.....			
2.	Coal, soft (3 paper-thin shales)...	2' 7 "		
3.	Shale, soft.....	0 6		
4.	Coal, medium-hard.....	2 8½		
5.	Shale, soft.....	0 5		
6.	Coal, hard.....	2 3	8	5½
7.	Shale, pavement.....			

A sample (No. 13P) was collected from Nos. 2, 4, and 6 of section, the composition of which is published under **Mine No. 385** in the Survey Table of Coal Analyses at the end of this Chapter.

R. M. Duffy Farm Mine—No. 386 on Map II.

On hillside north of Enoch Branch of Muddlety Creek, 1.1 miles N. 32° E. of Muddlety; **Coalburg Coal**; elevation, 2000' B.

			Ft.	In.
1.	Shale, black, Coalburg		2	0
2.	Coal	0' 3"		
3.	Slate, black, soft, bony.....	1 8		
4.	Coal, splinty.....	0 7		
5.	Coal, soft.....	1 0		

		Ft.	In.
6. Coal, cannel	0' 7".....	4	1
7. Slate, pavement, and concealed.....		5	0
8. Sandstone, massive.....			

A sample (No. 260R) was collected from Nos. 4, 5, and 6 of section, the composition of which is published under **Mine No. 386** in the Survey Table of Coal Analyses at the end of this Chapter.

Coal Blossom—No. 387 on Map II.

On hillside north of Lower Spruce Run of Brushy Fork of Muddlety Creek, 0.9 mile north of Hookersville; **Coalburg Coal**; elevation, 1940' B.

Coal blossom, thickness unknown.

Coal Blossom—No. 388 on Map II.

On south end of Powell Mountain, 1.3 miles northeast of Hookersville; **Coalburg Coal**; elevation, 2007' L.; for stratigraphic position see Hookersville Section, page 149.

	Ft.	In.
Coal blossom.....	0	8

John Hill Coal Blossom—No. 389 on Map II.

On hillside south of Muddlety Creek, 1.6 miles N. 84° E. of Hookersville; **Coalburg Coal**; elevation, 2085' B.; observation by Price.

Coal blossom, thickness unknown.

Craig Heirs Farm Mine—No. 390 on Map II.

On hillside east of Little Creek, 1.2 miles N. 7° E. of Opal; **Coalburg Coal**; elevation, 2100' B.; observation by Price.

	Ft.	In.
Sandstone		
Coal, soft	0' 6 "	
Shale	0	2
Coal, soft.....	0	2½
Shale	0	3½
Coal, hard.....	0	10
Shale, soft, black.....	0	5½
Coal	0	3
Shale	0	0½
Coal, hard.....	0	6½
Shale	0	0½
Coal, hard.....	0	9
Shale	1	5

		Ft.	In.
Coal, soft	0' 7 "		
Shale	0 2		
Coal, soft.....	0 4		
Shale, soft.....	0 1½		
Coal, soft.....	0 1		
Bone	0 2		
Bony splint.....	0 2		
Coal, hard.....	1 2		
Niggerhead	0 2		
Coal, hard.....	0 7		
Shale, light.....	0 4		
Niggerhead	0 4		
Coal, hard	0 9½	10	6
Shale			

Andrew Milam Farm Mine—No. 391 on Map II.

On a short branch of Muddlety Creek, 0.8 mile S. 40° W. of Opal;
Coalburg Coal; elevation, 2225' B.

		Ft.	In.
Shale, gray.....			
Coal, soft, rotten.....	2' 0"		
Coal, soft.....	0 8		
Coal, splint.....	0 8		
Coal, cannel splint.....	1 6	4	10
Slate, pavement.....			

O. C. Lewis et al. Prospect—No. 392 on Map II.

On a short branch of Muddlety Creek, 0.4 mile N. 34° E. of Opal;
Coalburg Coal; elevation, 2105' B.

		Ft.	In.
1. Sandstone, massive, Coalburg.....			
2. Coal, soft (3 paper-thin partings) 0' 7 "			
3. Shale, soft, light.....	1 2		
4. Coal, soft.....	0 2		
5. Shale, soft.....	0 0½		
6. Coal, soft.....	0 2½		
7. Bony splint.....	0 3		
8. Coal, medium-hard.....	1 7½		
9. Niggerhead	0 1½		
10. Coal, hard, splinty.....	0 10½		
11. Niggerhead	0 0½		
12. Coal, hard, splinty.....	0 5½	5	6½
13. Shale, pavement.....			

A sample (No. 16P) was collected from Nos. 2, 4, 6, 8, 10, and 12 of section, the composition of which is published

under Mine No. 392 in the Survey Table of Coal Analyses at the end of this Chapter.

Hawkins-Kinney Estate Prospect—No. 393 on Map II.

On a short branch of Muddlety Creek, 0.7 mile N. 69° E. of Opal; Coalburg Coal; elevation, 2100' B.; observation by Price.

		Ft.	In.
Sandstone			
Coal, soft.....	0' 6 "		
Shale, dark, soft.....	2 3		
Coal, soft.....	0 4½		
Niggerhead	0 1		
Coal, soft.....	0 1		
Limestone, with plants.....	0 2½		
Coal, soft.....	0 11		
Coal, hard, splint.....	1 2		
Niggerhead	0 1		
Coal, hard.....	1 0	6	8
Slate			

Hawkins-Kinney Estate Farm Mine (John Grose Opening)— No. 394 on Map II.

On hillside east of Laurel Fork of Muddlety Creek, 1.8 miles north-west of Calvin; Coalburg Coal; elevation, 2390' B.

		Ft.	In.
Coal blossom.....			
Shale, gray.....		5	0
Coal	0' 7"		
Coal, bony.....	0 3		
Coal, soft.....	0 9		
Coal, splinty.....	2 7		
Slate, dark.....	0 6		
Coal, medium-soft.....	2 0	6	8
Slate, pavement.....			

Claude Braden Farm Mine—No. 395 on Map II.

On hillside east of Laurel Fork of Muddlety Creek, 1.5 miles north-west of Calvin; Coalburg Coal; elevation, 2410' B.

		Ft.	In.
1. Coal blossom.....			
2. Concealed and shale.....		7	0
3. Coal	0' 2"		
4. Slate, gray.....	0 3		
5. Coal	0 11		
6. Shale, gray.....	2 0		
7. Coal	0 8		

		Ft.	In.
8. Coal, bony.....	0 3		
9. Coal, soft	0' 10"		
10. Coal, splinty.....	2 3		
11. Slate, dark.....	0 5		
12. Coal, medium-soft.....	1 10	9	7
13. Slate, pavement.....			

A sample (No. 242R) was collected from the mining section, Nos. 10 and 12, the composition of which is published under Mine No. 395 in the Survey Table of Coal Analyses at the end of this Chapter.

Tioga Lumber Company Exposure—No. 396 on Map II.

On east side of Muddlety Creek, 2.9 miles S. 84° E. of Opal; Coalburg Coal; elevation, 2060' B.; observation by Price.

		Ft.	In.
Shale		10	0
Coal	0' 10"		
Shale, gray.....	0 9		
Coal	0 3	1	10
Shale, gray, soft, to grade.....		9	6

Coalburg Coal, Beaver District.

In Beaver District the Coalburg Coal crops in certain localities on the waters of Beaver and Little Beaver Creeks, being under drainage in the northern end, next to Tioga. The following openings were noted:

Abram Hinkle Farm Mine—No. 397 on Map II.

On hillside west of Little Beaver Creek, 1 mile northwest of Calvin; Coalburg Coal; elevation, 2435' B.; observation by Price.

		Ft.	In.
Shale			
Bone and shale.....		1	0
Coal, bony	1' 6"		
Coal	2 2		
Bone	0 6		
Coal, visible.....	1 6	5	8

Charles Henderson Farm Mine—No. 398 on Map II.

On east side of Beaver Creek, 0.3 mile northeast of Delphi; **Coalburg Coal**; elevation, 2225' B.

		Ft.	In.
Slate			
Coal	0' 6 "		
Slate	0 1		
Coal	0 5½		
Slate	0 0½		
Coal, bony	1 9	2	10
<hr/>			
Slate, pavement			

Coal Prospect—No. 399 on Map II.

On Paddy Run of Beaver Creek, 0.8 mile northeast of Delphi; **Coalburg Coal**; elevation, 2240' B.

		Ft.	In.
Shale, dark, Coalburg			
Coal, soft	0' 9 "		
Slate, black	0 1		
Coal	0 5		
Slate, black	0 0½		
Coal, medium-hard	1 3½	2	7
<hr/>			
Slate, pavement			

Ovid Ratliff Farm Mine—No. 400 on Map II.

On Paddy Run of Beaver Creek, 0.9 mile northeast of Delphi; **Coalburg Coal**; elevation, 2250' B.

		Ft.	In.
Shale, dark, Coalburg			
Coal	0' 8 "		
Slate, black	0 1		
Coal	0 5½		
Slate, black	0 0½		
Coal, soft	0 4		
Coal, bony splint	1 1	2	8
<hr/>			
Slate, pavement			

Edwin Jones Farm Mine—No. 401 on Map II.

Glade District, Webster County, on west side of Strouds Creek, 1 mile southeast of Tioga; **Coalburg Coal**; elevation, 2245' B.

		Ft.	In.
Sandstone, shaly			
Coal	0' 3"		
Slate, gray	0 1		
Coal, soft	0 10		
Bone	0 2		

		Ft.	In.
Coal, soft	0' 7"		
Coal, bony	0 3		
Coal, medium-hard.....	0 10	3	0
<hr style="width: 10%; margin-left: auto; margin-right: 0;"/>			
Slate, pavement			

Farley Crites Farm Mine—No. 402 on Map II.

Glade District, Webster County, on west side of Strouds Creek, 0.9 mile southeast of Tioga; **Coalburg Coal**; elevation, 2225' B.

		Ft.	In.
Sandstone, shaly, Upper Coalburg		10	0
Coal, bony	0' 5"		
Coal, soft	0 11		
Bone	0 2		
Coal, soft	0 6		
Coal, bony	0 4		
Coal, medium-hard	0 11	3	3
<hr style="width: 10%; margin-left: auto; margin-right: 0;"/>			
Slate, pavement			

Quantity of Coalburg Coal Available.

The following table, compiled by Tucker from a planimetric measurement of the outcrop on Map II, shows the probable amount of Coalburg Coal in the county:

Probable Amount of Coalburg Coal.

District	Thickness of Coal Assumed. Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Jefferson	3	27.25	17,440	2,279,059,200	91,162,368
Grant	3	12.10	7,744	1,011,985,920	40,479,437
Summersville	3	24.40	15,616	2,040,698,880	81,627,955
Hamilton	3	97.80	62,592	8,179,522,560	327,180,902
Beaver	2	11.60	7,424	646,778,880	25,871,155
Totals.....		173.15	110,816	14,158,045,440	566,321,817

WINIFREDE COAL.

The Winifrede Coal, previously discussed in Chapter VI, pages 246-8, is found in the ridges of the northern and north-western portions of the county, next to Fayette, Clay, Braxton, and Webster Counties, its horizon passing above the tops of the ridges a few miles north of Gauley River, and being entirely above them in the central and southern portions. In the region of its occurrence it has been prospected only to a limited extent, probably because of larger beds lying both above and below it. Such openings as are available show it to be sometimes single- and sometimes multiple-bedded, varying in thickness from 1 to 5 feet, and frequently containing both splinty and gaseous benches. In quality it is high in volatile matter and low in sulphur, phosphorus, and ash, apparently preserving the same freedom from chemical impurities that has given it an enviable reputation at its type locality in the Great Kanawha Valley. Its outcrop is not shown on Map II but its position in the hills may be approximated by using its interval below the Coalburg, which as recorded in the Table of Intervals above and below the Eagle Coal, page 95, varies from 50 to 125 feet, depending on the locality. Figure 12 shows the regions in which it is believed to be of minable thickness and purity.

Winifrede Coal, Jefferson District.

In Jefferson District the Winifrede Coal crops in the hills along the waters of Twentymile Creek, Gauley River, Little Elk Creek, Laurel Creek, and Peters Creek, the following openings and exposures having been noted:

**Lackawanna Coal & Lumber Company Prospect—
No. 408 on Map II.**

In Pleasant District, Clay County, on Road Fork of Rockcamp Fork of Twentymile Creek, 1.7 miles N. 25° W. of Vaughan; **Winifrede Coal**; elevation, 1025' B.

	Ft.	In.
Sandstone, massive		
Coal, splint	1'	2"
Niggerhead	0	1
Coal, splint	1	4
	2	7
Slate, pavement		

The following prospect is reported by Ray V. Hennen, data on the same having been previously published in the Braxton and Clay Report of the Survey, page 736:

Coal Prospect—No. 408A on Map II.

On north bank of Rock Camp Fork of Twentymile Creek, 0.8 mile northeast of Greendale; **Winifrede Coal**; elevation, 1070' B.; observation by Ray V. Hennen.

	Ft.	In.
Sandstone, Upper Winifrede , platy, but massive top, visible	25	0
Coal, gas, medium-hard	0'	7½"
Slate, gray, dark	0	0½
Coal, gas, medium-hard	1	0
	1	8
Shale, gray, visible	8	0

Lewis Coal & Land Company Prospect—No. 409 on Map II.

On hillside south of Twentymile Creek, 1.7 miles S. 58° W. of Harriet; **Winifrede Coal**; elevation, 1495' B.; for stratigraphic position, see Hardway Branch of Twentymile Section, page 111.

	Ft.	In.
1. Slate, dark		
2. Coal	0'	3"
3. Slate, gray	0	2
4. Coal, semi-splint	3	9
	4	2
5. Bottom?		

A sample (No. 297R) was collected from No. 4 of section, the composition of which is published under **Mine No. 409** in the Survey Table of Coal Analyses at the end of this Chapter. At this point the coal comes 105 feet below the Coalburg.

Coal Blossom—No. 410 on Map II.

On hillside north of Gauley River, 1.1 miles west of Swiss; **Winifrede Coal**; elevation, 1410' B.; for stratigraphic position, see Swiss Section, page 115.

Coal blossom, thickness unknown.

Lackawanna Coal & Lumber Company Prospect— No. 411 on Map II.

On hillside west of Little Elk Creek, 3.5 miles N. 39° E. of Swiss; **Winifrede Coal**; elevation, 1750' B.

	Ft.	In.
Fallen shut, good coal on dump, mine timbers indicate		
a thickness of	4	0

Winifrede Coal, Grant District.

In Grant District the Winifrede Coal crops mainly on the waters of Twentymile Creek, and in the ridges north of Peters Creek, only a few isolated areas being present south of the latter stream. The following openings and exposures were noted:

Fenton Morris Farm Mine—No. 412 on Map II.

On hillside north of Twentymile Creek, 0.2 mile north of Harriet; **Winifrede Coal**; elevation, 1435' B.

	Ft.	In.
Fallen shut, coal, reported clean, with thickness of		
3' 0" to	4	0

At this point the coal comes 165 feet below the Kanawha Black Flint ledge.

Coal Blossom—No. 413 on Map II.

On Road Fork of Robinson Fork of Twentymile Creek, 2.2 miles north of Drennen; **Winifrede Coal**; elevation, 1845' B.

Coal blossom, thickness unknown.

Coal Blossom—No. 415 on Map II.

In road west of Hutchinson Branch of Peters Creek, 0.9 mile N. 44° W. of Gilboa; **Winifrede Coal**; elevation, 1995' B.; for stratigraphic position see Gilboa Section, page 122.

Coal blossom, thickness unknown.

At the above point the coal comes 55 feet above the fossiliferous Winifrede Limestone.

Winifrede Coal, Summersville District.

In Summersville District the Winifrede horizon crops on the waters of Twentymile, Buffalo, Peters, and Muddlety Creeks, no prospects having been observed. In view of its occurrence still farther northeast it seems probable that prospecting along these streams would reveal it in minable thickness.

Winifrede Coal, Hamilton District.

In Hamilton District the Winifrede Coal crops on the waters of Buffalo Creek, Birch River, and Muddlety Creek, and on the head of Persinger Creek, the following openings and exposures having been noted:

**Elk River Coal & Lumber Company Exposure—
No. 416 on Map II.**

On south side of Buffalo Creek, 3.2 miles S. 64° E. of Widen; **Winifrede Coal**; elevation, 1320' B.

	Ft.	In.
Sandstone, Upper Winifrede	15	0
Shale, gray	1	0
Coal, soft	1	8
Shale, gray, and concealed.....	8	0
Coal, reported in creek		

John Crites Farm Mine—No. 417 on Map II.

On north side of Birch River, 1.5 miles N. 32° W. of Birch River village; **Winifrede Coal**; elevation, 1108' L.

	Ft.	In.
Shale, sandy	5	0
Coal, soft	1'	5"
Coal, bony	0	2
Coal, soft	0	3

		Ft.	In.
Slate, gray	0' 2"		
Coal, soft	0 2	2	2
Slate, black, pavement.....			

Joseph Tinnil Prospect—No. 418 on Map II.

On hillside east of Birch River, 0.9 mile N. 27° W. of Birch River village; **Winifrede Coal**; elevation, 1240' B.

	Ft.	In.
Fallen shut, coal, reported.....	1	0

C. W. Bowen Exposure—No. 419 on Map II.

In Mill Creek, 1.5 miles N. 45° E. of Birch River village; **Winifrede Coal**; elevation, 1280' B.; observation by Price.

		Ft.	In.
Shale, dark, nodules of ferruginous carbonate or oxide		3	4
Coal, medium-soft	0' 7"		
Shale, soft	0 2		
Coal, hard, splinty.....	0 6	1	6
Shale, dary-gray, argillaceous		6	0

Tioga Lumber Company Prospect—No. 420 on Map II.

On Mudlick Run of Anthony Creek, 2.3 miles S. 54° E. of Birch River village; **Winifrede Coal**; elevation, 1595' B.; for stratigraphic position see Mudlick Run of Anthony Creek Section, page 143.

Fallen shut, thickness unknown.

Tioga Lumber Company Prospect—No. 421 on Map II.

On hillside east of Road Fork of Anthony Creek, 2.5 miles N. 58° W. of Tioga; **Winifrede Coal**; elevation, 1845' B.

Fallen shut, thickness unknown.

John H. Dodrill Farm Mine—No. 422 on Map II.

On south hillside of Poplar Creek, 3.1 miles S. 68° E. of Birch River village; **Winifrede Coal**; elevation, 1650' B.

	Ft.	In.
Fallen shut, coal, reported.....	3	0

David McQueen Farm Mine—No. 423 on Map II.

On a short branch of McMillion Creek, 1.3 miles N. 75° E. of Kirkwood; **Winifrede Coal**; elevation, 2215' B.; observation by Price.

Fallen shut, reported as follows:

		Ft.	In.
Coal	2' 6"		
Parting?	2 0		
Coal, cannel	1 6	6	0

A. M. C. Hutchinson Farm Mine—No. 424 on Map II.

On a short branch of McMillion Creek, 0.7 mile S. 8° W. of Opal; **Winifrede Coal**; elevation, 2175' B.; observation by Price.

		Ft.	In.
1. Shale			
2. Coal, soft, gas	0' 6 "		
3. Shale, soft	0 2		
4. Coal, soft	0 4		
5. Bone	0 3		
6. Coal, medium-hard	0 6½		
7. Shale, soft	0 0½		
8. Coal, medium-hard	1 2		
9. Shale, soft	0 0¼		
10. Coal, hard, splinty	1 1¾	4	2
11. Concealed in water			

A sample (No. 15P) was collected from Nos. 2, 4, 6, 7, 8, 9, and 10 of section, the composition of which is published under **Mine No. 424** in the Survey Table of Coal Analyses at the end of this Chapter.

Coal Blossom—No. 425 on Map II.

On north side of Lower Spruce Run of Brushy Fork of Muddlety Creek, in road, 0.8 mile north of Hookersville; **Winifrede Coal**; elevation, 1905' B.

	Ft.	In.
Coal, visible, with black slate, about.....	1	0

Hill Groves Prospect—No. 426 on Map II.

On hillside north of Brushy Fork of Muddlety Creek, 2.6 miles N. 38° E. of Hookersville; **Winifrede Coal**; elevation, 1955' B.; observation by Price.

Fallen shut, small seam, thickness unknown.

Coal Prospect—No. 427 on Map II.

On hillside south of Muddlety Creek, 1.2 miles east of Hookersville; **Winifrede Coal**; elevation, 2025' B.; observation by Price.

	Ft.	In.
Fallen shut, coal, reported by W. Hill.....	1	6

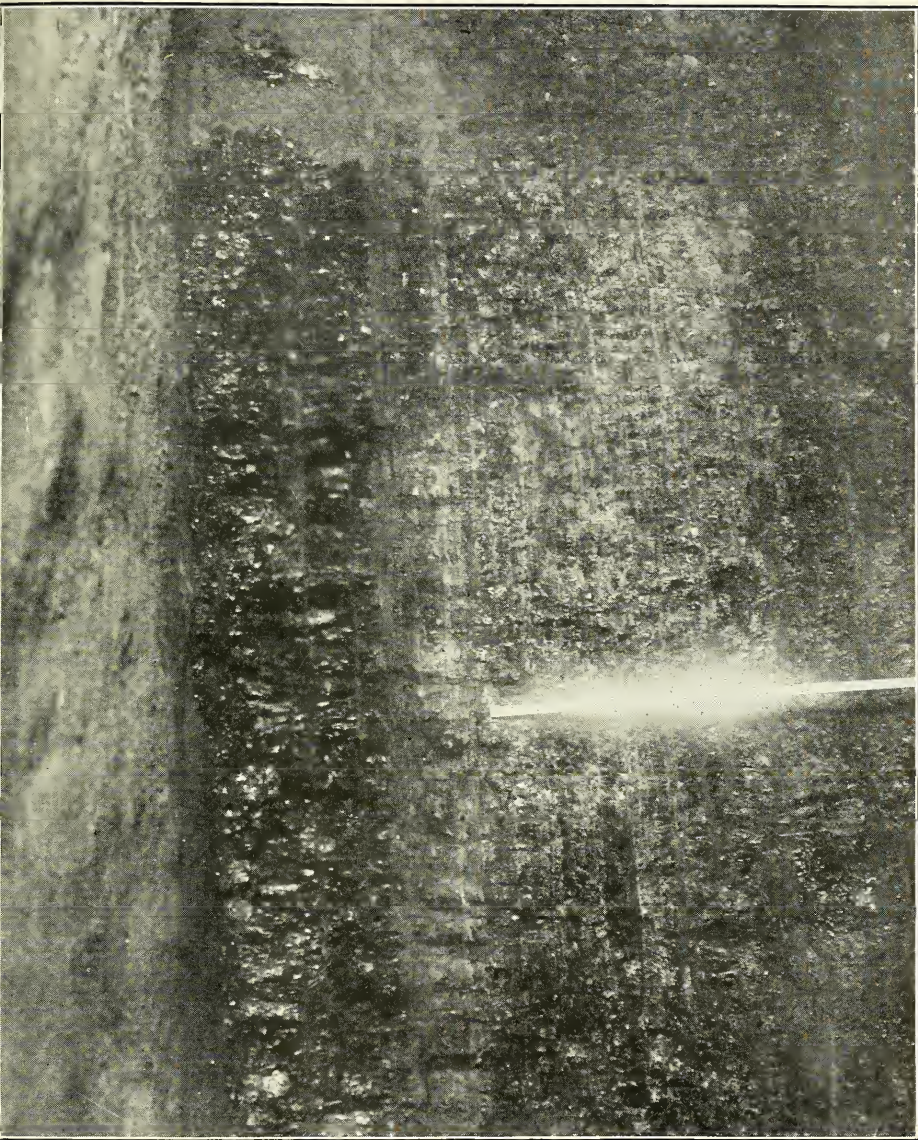


PLATE XXIV. — Eagle Coal at Lemon J. Groves Mine (No. 799 on Map II), west of Summersville; two-foot rule stands at base; typical bony streak shows just above rule.

Photo by E. E. Harris.

Winifrede Coal, Beaver District.

In Beaver District the Winifrede Coal crops on the head of Persinger Creek, and on Little Beaver and Beaver Creeks, and also farther southeast in Cottle Knob and the adjoining high ridge northward. In the northern end of the district it is under drainage. The following openings were noted:

Frank Mullins Coal Stripping—No. 428 on Map II.

On a branch of Little Beaver Creek, 2.1 miles S. 63° W. of Delphi; **Winifrede Coal**; elevation, 2260' B.; observation by Price.

	Feet.	Inches.
Shale, dark, sandy.....	2	0
Coal, medium-hard, dirty.....	0'	10"
Coal, medium-hard	0	5
Shale	0	4
Coal, medium-hard.....	0	3
	<hr/>	
Shale, dark	1	10

Coal Prospect—No. 429 on Map II.

On a branch of Beaver Creek, 2.2 miles S. 31° W. of Delphi; **Winifrede Coal**; elevation, 2245' B.; observation by Reger and Price.

	Feet.	Inches.
Sandstone, massive, Upper Winifrede		
Coal, soft	0'	6½"
Coal, bony splint.....	0	4½
Coal, hard, streaks of bone.....	0	10
	<hr/>	
Slate, pavement	1	9

John Woods Farm Mine—No. 430 on Map II.

On east side of Cottle Knob, 1.8 miles west of Allingdale; **Winifrede Coal**; elevation, 2550' B.; for stratigraphic position and details see Camden-on-Gauley Section, page 153.

Quantity of Winifrede Coal Available.

The following table, compiled by Tucker from the acreage as limited by Figure 12, shows the probable amount of Winifrede Coal in the county:

Probable Amount of Winifrede Coal.

District	Thickness of Coal Assumed. Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Jefferson	2.0	33.45	21,408	1,865,064,960	74,602,598
Grant	2.0	14.75	9,440	822,412,800	32,896,512
Summersville	2.0	28.30	18,112	1,577,917,440	63,116,698
Hamilton	1.5	115.00	73,600	4,809,024,000	192,360,960
Beaver	1.5	14.40	9,216	602,173,440	24,086,938
Totals .....	...	205.90	131,776	9,676,592,640	387,063,706

CHILTON COAL.

The Chilton Coal, previously discussed in Chapter VI, page 251, crops over a considerable portion of the northern half of the county, its horizon being under drainage on the headwaters of many of the streams. South of Gauley River it is not found, as its position is above the tops of the ridges. In the region of its outcrop it is generally free from slate partings, its thickness varying from 1 to 4 feet, being usually 2 feet or less. The characteristic flint fire clay parting which distinguishes it in Logan and other southwestern counties, where it is mined extensively, seems to be wholly lacking in Nicholas. In quality it is high in volatile matter, and low in sulphur, phosphorus, and ash, being usually partly splint and partly gaseous, and frequently showing benches of cannel. Its outcrop is not shown on Map II but its position may be approximated from its relationship to the Coalburg, below which it comes by an interval varying from 100 to 200 feet, as shown for various localities in the county in the Table of Intervals Above and Below the Eagle Coal, page 95. Figure 13 shows the localities in which it is believed that it will eventually prove minable, the line shading being broken to indicate the somewhat patchy condition of its occurrence.

In Jefferson District the Chilton Coal crops on the waters of Twentymile Creek, Gauley River, and Little Elk, Laurel and Peters Creeks, the following openings and exposures have been noted:

Greenbrier Coal Company Prospect—No. 437 on Map II.

On hillside east of Bells Creek, 0.6 mile S. 40° E. of Dixie; **Chilton Coal**; elevation, 1135' B.

	Ft.	In.
Coal, visible, about.....	1	0

Greenbrier Coal Company Prospect—No. 438 on Map II.

On hillside north of Twentymile Creek, 0.8 mile northeast of Belva, **Chilton Coal**; elevation, 1135' B.

	Ft.	In.
Coal, clean	1	8

Coal Blossom—No. 439 on Map II.

On hillside north of Gauley River, 1 mile west of Swiss; **Chilton Coal**; elevation, 1325' B.; for stratigraphic position, see Swiss Section, page 115.

Coal blossom, thickness unknown.

Coal Blossom—No. 440 on Map II.

On hillside south of Twomile Branch of Twentymile Creek, 3.5 miles N. 77° E. of Vaughan; **Chilton Coal**; elevation, 1290' B.

Coal blossom, thickness unknown.

Chilton Coal, Grant District.

In Grant District the Chilton Coal crops on the waters of Twentymile and Peters Creeks, the following exposures having been noted:

Theodore Morris Farm Mine—No. 441 on Map II.

On hillside north of Twentymile Creek, 0.2 mile south of Harriet; **Chilton Coal**; elevation, 1490' B.

	Ft.	In.
Fallen shut, coal, reported	4	0

Coal Blossom—No. 442 on Map II.

On Jerry Fork of Peters Creek, 2.2 miles N. 8° E. of Drennen;
Chilton Coal; elevation, 1715' B.
 Coal blossom, thickness unknown.

Coal Exposure—No. 443 on Map II.

On a short branch of Peters Creek, 0.8 mile northwest of Gilboa;
Chilton Coal; elevation, 1865' B.; for stratigraphic position, see Gilboa
 Section, page 122.

	Ft.	In.
Coal	3	0

Chilton Coal, Summersville District.

In Summersville District the Chilton Coal crops on the waters of Twentymile Creek. Beech Fork of Buffalo Creek, and Peters and Muddlety Creeks, the following openings and exposures having been noted:

The following prospect is reported by Ray V. Hennen, data on the same having been published in the Braxton and Clay Report of the Survey, pages 266 and 139:

Coal Prospect—No. 444 on Map II.

On south side of Lilly Fork of Buffalo Creek, 3.2 miles northeast of Harriet; **Chilton Coal**; elevation, 1185' B.; observation by Ray V. Hennen; for stratigraphic position and details see Beech Fork of Lilly Section, page 131.

Coal Prospect—No. 445 on Map II.

In a ravine north of Twentymile Creek, 2.3 miles N. 64° E. of Harriet; **Chilton Coal**; elevation, 1370' B.
 Fallen shut, thickness unknown.

Coal Exposure—No. 446 on Map II.

On hillside north of Twentymile Creek, 3.3 miles N. 67° E. of Harriet; **Chilton Coal**; elevation, 1420' B.

	Ft.	In.
Sandstone, massive, Upper Chilton	30	0
Shale, sandy	4	0
Slate, black	1	0
Coal	0	8
Slate, dark	5	0

A. E. Dorsey Farm Mine—No. 447 on Map II.

On hillside west of Muddlety Creek, 1.7 miles south of Muddlety; **Chilton Coal**; elevation, 1965' B.

	Ft.	In.
Fallen shut, coal, reported by Omar Robinson.....	3	0

According to Mr. Robinson's report, the coal was once mined at this point by J. H. Robinson.

Elijah Bobbitt Exposure—No. 448 on Map II.

On hillside south of Trout Run of Muddlety Creek, 1.0 mile S. 45° W. of Muddlety; **Chilton Coal**; elevation, 1895' B.

	Ft.	In.
Slate and soil		
Coal, medium-hard	1	8
Slate, pavement		

Chilton Coal, Hamilton District.

In Hamilton District the Chilton Coal crops on the waters of Birch River and Muddlety and Persinger Creeks, the following openings and exposures having been noted:

Joseph Tinnil Farm Mine—No. 449 on Map II.

In ravine east of Birch River, 1.0 mile N. 25° W. of Birch River village; **Chilton Coal**; elevation, 1185' B.

	Ft.	In.
Sandstone, shaly, Upper Chilton.....	10	0
Coal	1	7
Slate, pavement		

Coal Blossom—No. 450 on Map II.

In road along hillside west of Powell Creek, 1.6 miles S. 30° W. of Birch River village; **Chilton Coal**; elevation, 1260' B.
Coal blossom, thickness unknown.

Coal Horizon—No. 451 on Map II.

On hill near source of Glade Creek, 1.5 miles north of Persinger; **Chilton Coal**; elevation, 2230' B.; observation by Price.

	Ft.	In.
Sharp bench, coal, reported.....	2	5

D. H. Pletcher Farm Mine—No. 452 on Map II.

On west hillside of McMillion Creek, 1.5 miles N. 65° E. of Kirkwood; **Chilton Coal**; elevation, 2150' B.

Coal, with cannel binder, thickness unknown.

Coal Exposure—No. 453 on Map II.

On hillside south of a north branch of McMillion Creek, 2.3 miles N. 65° E. of Kirkwood; **Chilton Coal**; elevation, 2145' B.; observation by Price.

Coal, in root slip, thickness unknown.

Cameron S. Hutchinson Farm Mine—No. 454 on Map II.

On hillside south of a north branch of McMillion Creek, 2.4 miles N. 63° E. of Kirkwood; **Chilton Coal**; elevation, 2160' B.; observation by Price. Fallen shut, reported as follows:

	Ft.	In.
Coal , fairly thick.....		
Shale		
Coal , cannel	1	6
Shale		
Coal , thin seam.....		

J. H. Baker Farm Mine—No. 455 on Map II.

On hillside south of McMillion Creek, 1.9 miles northwest of Calvin; **Chilton Coal**; elevation, 2250' B.; observation by Price.

	Ft.	In.
Shale		
Coal , reported	2	0

Coal Exposure—No. 456 on Map II.

On north hillside of McMillion Creek, 1.8 miles northwest of Calvin; **Chilton Coal**; elevation, 2190' B.; observation by Price.

	Ft.	In.
Soil, (top of coal not seen).....		
Coal	1	6
Shale		

Coal Exposure—No. 457 on Map II.

At south end of Powell Mountain, 1.1 miles northeast of Hookersville; **Chilton Coal**; elevation, 1964' L.; for stratigraphic position and details see Hookersville Section, page 149.

Chilton Coal, Beaver District.

In Beaver District the Chilton Coal crops on Persinger, Little Beaver, and Beaver Creeks, and in the high areas east of the latter stream, its horizon being under drainage in the northern end of the district. The following openings and exposures were noted:

Coal Exposure—No. 458 on Map II.

In road, north of a branch of Beaver Creek, 2.1 miles S. 27° W. of Delphi; **Chilton Coal**; elevation, 2210' B.

	Ft.	In.
Coal, in road, about.....	2	0

Coal Prospect--No. 459 on Map II.

On east side of Cottle Knob, 1.7 miles west of Allingdale; **Chilton Coal**; elevation, 2460' B.; for stratigraphic position see Camden-on-Gauley Section, page 153.

	Ft.	In.
Coal, reported	2	4

Quantity of Chilton Coal Available.

The following table, compiled by Tucker from a close estimate of the acreage, as limited on Figure 13, shows the probable amount of Chilton Coal available in the county:

Probable Amount of Chilton Coal.

District	Thickness of Coal Assumed. Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Jefferson	1	38.80	24,832	1,081,681,920	43,267,277
Grant	1	16.60	10,624	462,781,440	18,511,257
Summersville	1	30.10	19,264	839,139,840	33,565,594
Hamilton	1	120.00	76,800	3,345,408,000	133,816,320
Beaver	1	15.60	9,984	434,903,040	17,396,121
Totals		221.10	141,504	6,163,914,240	246,556,569

ALMA COAL.

The Alma Coal, previously discussed in Chapter VI, pages 268-9, is found mainly in the northwestern portion of the being a persistent seam on the waters of Twentymile Creek, and extending eastward to the headwaters of Peters Creek and the western side of the Muddlety Creek drainage. As a rule it is hard, splinty, and single-bedded, varying from $1\frac{1}{2}$ to 2 feet in thickness, but occasionally has a thickness of three or four feet, being usually multiple-bedded in such cases. Owing to its general freedom from slate partings it seems probable that it will eventually furnish a considerable amount of commercial fuel, although at the present time it could hardly be mined in competition with other thick beds of the county. In quality it is high in volatile matter, medium high in sulphur, low in phosphorus, and fair in ash content. Its outcrop is not shown on Map II, but its position is only 20 to 40 feet above the Campbell Creek (Peerless Bench) Coal, the outcrop of which is delineated on the map. Figure 14 shows its supposed minable extent.

Alma Coal, Jefferson District.

In Jefferson District the Alma Coal crops along most of the major streams, having been prospected mainly on the waters of Twentymile Creek. The following openings were noted:

**Lackawanna Coal & Lumber Company Prospect—
No. 523 on Map II.**

On the south side of Lick Branch of Open Fork of Bells Creek, 0.8 mile S. 70° E. of Cambria; Alma Coal; elevation, 845' B.

	Ft.	In.
Shale, gray, sandy.....	10	0
Coal, soft	1	8
Slate, pavement.....		

**Lackawanna Coal & Lumber Company Exposure—
No. 524 on Map II.**

On Lilly Branch of Twentymile Creek, 1.5 miles S. 73° E. of Vaughan; Alma Coal; elevation, 1035' B.

	Ft.	In.
Sandstone, Peerless		
Shale, gray	4	0
Coal, soft	1'	1"
Slate, dark	0	1
Coal	0	3
Fire clay shale		

Coal Prospect—No. 525 on Map II.

On west side of Ash Fork of Twentymile Creek, 1.8 miles N. 60° E. of Vaughan; Alma Coal; elevation, 955' B.

	Ft.	In.
Sandstone, massive, Peerless.....	10	0
Coal, soft.....	2'	1"
Shale, gray	0	0½
Coal	0	2½
Slate, pavement		

Coal Prospect—No. 526 on Map II.

On south side of Twentymile Creek, 2.9 miles N. 78° E. of Vaughan; Alma Coal; elevation, 1000' B.

Fallen shut, thickness unknown.

Lewis Coal & Land Company Exposure—No. 527 on Map II.

On a ravine north of Twentymile Creek, 4.0 miles S. 65° W. of Harriet; **Alma Coal**; elevation, 1150' B.

	Ft.	In.
Sandstone, massive, Peerless		
Coal, soft	1'	0"
Coal, hard, slaty.....	0	5
Coal, cannel	0	6
Slate, gray	0	1
Coal	0	2
Shale, gray	0	6
Coal	0	2
Fire clay shale	2	10

Lewis Coal & Land Company Prospect—No. 528 on Map II.

On a short branch of Twentymile Creek, 3.3 miles S. 62° W. of Harriet; **Alma Coal**; elevation, 1115' B.

	Ft.	In.
Sandstone, massive, Peerless	5	0
Coal, hard, splinty.....	2	0
Slate, pavement		

Lewis Coal & Land Company Prospect—No. 529 on Map II.

On east side of Boardtree Branch of Twentymile Creek, 2.8 miles S. 68° W. of Harriet; **Alma Coal**; elevation, 1085' B.

	Ft.	In.
1. Sandstone, massive, Peerless	10	0
2. Coal, splinty	1	10
3. Slate, pavement		

A sample (No. 296R) was collected from No. 2 of section, the composition of which is published under **Mine No. 529** in the Survey Table of Coal Analyses at the end of this Chapter.

Lewis Coal & Land Company Prospect—No. 530 on Map II.

On west side of Boardtree Branch of Twentymile Creek, 2.9 miles S. 71° W. of Harriet; **Alma Coal**; elevation, 1085' B.

	Ft.	In.
Sandstone, massive, Peerless	15	0
Coal, splinty	1	9
Slate, pavement		

Lewis Coal & Land Company Prospect—No. 531 on Map II.

Harriet; Alma Coal; elevation, 1100' B.

	Ft.	In.
Sandstone, massive, Peerless.....		
Coal, hard	1	11
Slate, pavement		

Lewis Coal & Land Company Prospect—No. 532 on Map II.

On north side of Twentymile Creek, 1.9 miles S. 58° W. of Harriet; Alma Coal; elevation, 1110' B.

	Ft.	In.
Sandstone, roof		
Coal, thickness concealed.....		

Joseph Cavendish Farm Mine—No. 533 on Map II.

On a short branch of Gauley River, 0.8 mile N. 74° W. of Vinton; Alma Coal; elevation, 1710' B.

	Ft.	In.
Fallen shut, coal, reported by Charles Legg.....	3	0

Alma Coal, Grant District.

In Grant District the Alma Coal horizon crops generally on the waters of Twentymile and Peters Creeks and in a few of the high ridges farther south, having been prospected on the first-named stream where the following openings were noted:

Lewis Coal & Land Company Farm Mine—No. 534 on Map II.

On west side of Robinson Fork of Twentymile Creek, 1.8 miles S. 45° W. of Harriet; Alma Coal; elevation, 1136' L.

	Ft.	In.
1. Shale, gray, sandy.....		
2. Shale, ferruginous	1	6
3. Coal, hard, splint.....	2	3
4. Slate, pavement		

A sample (No. 296R) was collected from No. 3 of section, the composition of which is published under Mine No. 534 in the Survey Table of Coal Analyses at the end of this Chapter.

Lewis Coal & Land Company Prospect—No. 535 on Map II.

On east side of Robinson Fork of Twentymile Creek, 1.8 miles

S. 35° W. of Harriet; **Alma Coal**; elevation, 1160' B.

	Ft.	In.
Sandstone, massive, Peerless	15	0
Coal, (estimated).....	2	0

Lewis Coal & Land Company Prospect—No. 536 on Map II.

On Road Fork of Robinson Fork of Twentymile Creek, 2.0 miles S. 30° W. of Harriet; **Alma Coal**; elevation, 1195' B.

	Ft.	In.
Sandstone, massive, Peerless	10	0
Slate, black	1	0
Coal, medium-soft	2	4
Shale, pavement		

Coal Blossom—No. 537 on Map II.

On south side of Twentymile Creek, 0.2 mile south of Harriet; **Alma Coal**; elevation, 1290' B.; for stratigraphic position, see Harriet (South) Section, page 121.

Coal blossom, thickness unknown.

Alma Coal, Summersville District.

In Summersville District the **Alma Coal** crops mainly on the waters of Peters and Muddlety Creeks, the following openings having been noted:

John A. Stowers Farm Mine—No. 538 on Map II.

On head of a branch of Muddlety Creek, 0.7 mile north of Summersville; **Alma Coal**; elevation, 2116' L.

	Ft.	In.
1. Shale, gray, sandy	10	0
2. Coal, medium-soft.....	3	2
3. Slate, pavement		

A sample (No. 289R) was collected from No. 2 of section, the composition of which is published under **Mine No. 538** in the Survey Table of Coal Analyses at the end of this Chapter.

H. W. Herold Exposure—No. 539 on Map II.

On west side of Muddlety Creek, 2.5 miles south of Muddlety village; **Alma Coal**; elevation, 1900' B.

	Ft.	In.
Sandstone, massive, Peerless.....		
Concealed	6	0
Coal, slaty	1	8
Shale, sandy	6	0

Alma Coal, Hamilton District.

In Hamilton District the Alma Coal horizon crops on certain tributaries of Birch River and Muddlety Creek and at other points farther south but was seldom noted and probably has largely thinned out, the following exposure probably representing it:

Coal in Water Well—No. 540 on Map II.

On north side of Powell Creek, 1.4 miles S. 24° W. of Birch River village; **Alma Coal**; elevation, 1185' B.

Coal, 38 feet from surface, in Gabriel Robinson's water well, thickness unknown.

Alma Coal, Beaver District.

In Beaver District the Alma Coal horizon is exposed mainly on Beaver and Little Beaver Creeks but has apparently thinned to unimportant proportions, the following being the only exposure noted:

Coal Blossom—No. 541 on Map II.

In road on north side of Little Beaver Creek, 2.8 miles N. 38° E. of Persinger; **Alma Coal**; elevation, 2225' B.

Coal blossom, thickness unknown.

Quantity of Alma Coal Available.

The following table, compiled by Tucker from a close estimate of the acreage as outlined and limited by Figure 14, shows the probable amount of Alma Coal in the county:

Probable Amount of Alma Coal.

District	Thickness of Coal Assumed. Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal.
Jefferson	1.5	45.00	28,800	1,881,792,000	75,271,680
Grant	1.5	18.50	11,840	773,625,600	30,945,024
Summersville	1.5	23.00	14,720	961,804,800	38,472,192
Totals.....	.....	86.50	55,360	3,617,222,400	144,688,896

Campbell Creek (Peerless Bench) Coal.

The Campbell Creek (Peerless Bench) Coal, previously discussed in Chapter VI, page ???, outcrops generally over the northern half of the county, except along the headwaters of certain streams where it lies under drainage. South of Gauley River it is found in only a few high, isolated ridges southeast of Summersville, its horizon elsewhere being above the hilltops. As a rule it is single-bedded, soft and gaseous, varying in thickness from 2 to 3 feet, but in the western end of the county an additional bench of coal appears at the bottom, separated from the main seam by a shale parting several inches thick, the entire bed becoming four feet or more in thickness. In quality it is an exceptionally pure coal, high in volatile matter, and low in sulphur, phosphorus, and ash, some of the samples showing less than 1½ per cent. of the latter impurity. It has been used to a considerable extent for local domestic fuel and at Vaughan, Jefferson District, it is being mined commercially on a small scale. Its outcrop is delineated on Map II and Figure 15 shows its probable minable extent.

Campbell Creek (Peerless Bench) Coal, Jefferson District.

In Jefferson District the Campbell Creek (Peerless Bench) Coal crops generally on the waters of Twentymile Creek, Gauley River, and Little Elk and Peters Creeks, the following openings and exposures having been noted:

Green Smith Prospect—No. 545 on Map II.

On north side of Bells Creek, 0.25 mile S. 77° W. of Dixie; **Campbell Creek (Peerless) Coal**; elevation, 835' B.

	Ft.	In.
Sandstone, massive, Monitor		
Coal , soft	2	0
Slate, pavement		

John Smith Farm Mine—No. 546 on Map II.

Falls District, Fayette County, on Smith Branch of Bells Creek, 1.1 miles S. 80° W. of Dixie; **Campbell Creek (Peerless) Coal**; elevation, 815' B.

	Ft.	In.
Shale, sandy		
Coal , soft	0	4"
Shale, gray	1	6
Coal , splinty	0	4
Coal , soft	0	3
Coal , splinty	0	3
Coal , soft	1	0
Slate	0	1
Coal	0	7
	4	4
Slate, pavement		

John Smith Farm Mine—No. 547 on Map II.

Falls District, Fayette County, on south side of Bells Creek, 1.2 miles N. 81° W. of Dixie; **Campbell Creek (Peerless) Coal**; elevation, 785' B.

	Ft.	In.
Sandstone	2	0
Coal , medium-soft	1	10"
Slate, gray	0	1
Coal	0	9
	2	8
Shale, gray, pavement.....		

**Lackawanna Coal & Lumber Company Farm Mine—
No. 548 on Map II.**

On south side of Lick Branch of Open Fork of Bells Creek, 0.3 mile

N. 48° E. of Dixie; **Campbell Creek (Peerless) Coal**; elevation, 780' B.

	Ft.	In.
Sandstone, massive, Monitor		
Coal	0	3
Shale, gray	4	0
Coal , medium-soft	2	3
Slate, pavement, concealed, and sandy shale to creek	35	0

Coal Prospect—No. 549 on Map II.

On east hillside of Open Fork of Bells Creek, 0.3 mile S. 45° E. of Cambria; **Campbell Creek (Peerless) Coal**; elevation, 790' B.
Fallen shut, thickness unknown.

Greenbrier Coal Company Prospect—No. 550 on Map II.

On north side of Twentymile Creek, 0.8 mile northeast of Belva;
Campbell Creek (Peerless) Coal; elevation, 950' B.

	Ft.	In.
Coal , clean	1	8

Greenbrier Coal Company Prospect—No. 551 on Map II.

On north side of Twentymile Creek, 0.8 mile northeast of Belva;
Campbell Creek (Peerless) Coal; elevation, 940' B.

	Ft.	In.
Shale, gray		
Coal , soft	2	0
Slate, pavement.....		

N. D. Backus Farm Mine—No. 552 on Map II.

On hillside south of Twentymile Creek, 1.2 miles south of Vaughan; **Campbell Creek (Peerless) Coal**; elevation, 955' B.

	Ft.	In.
Shale, gray, sandy	10	0
Coal , soft, clean, reported by owner.....	3	4

The following mine is operated for commercial shipment:

Eagle Gas Coal Company Mine—No. 553 on Map II.

On west side of Twentymile Creek, 0.2 mile southwest of Vaughan;
Campbell Creek (Peerless) Coal; elevation, 835' B.; (section at face).

	Ft.	In.
1. Slate		
2. Coal , soft	2'	4½"
3. Slate, bony	0	6
4. Coal	0	7

		Ft.	In.
5. Slate, black	0' 1"		
6. Coal, soft	0 9½	4	4

"Principal office, Charleston, W. Va.; daily capacity, 100 tons; daily output, 75 tons; 14 miners and 10 laborers employed; electric storage motor haulage; greatest rise, southeast; sample No. 307R collected from Nos. 2, 4 and 6 of section, in No. 12 heading, for composition of which see Mine No. 553 in the Survey Table of Coal Analyses at the end of this Chapter. Newton Elkins, Superintendent, authority for mine data."

The storage motor equipment at the above operation is quite interesting because of its possible application to many small mines where standard power service is not available. The motor operates on 120 volts, being charged at night from a small power plant having a 22½-H.P. boiler and 7½-K.W. generator set, which in day time runs the mine pump and fan. Eight hours is required to recharge the motor which hauls a load of 10 mine cars up a 3 per cent. slope during the forenoon hours, its maximum load in the afternoon becoming gradually smaller.

The following section, measured at the mine mouth, shows the full section of the coal:

Eagle Gas Coal Company Mine—No. 553 on Map II.

(Section at mine mouth).

		Ft.	In.
Sandstone, massive, Monitor.....		10	0
Coal		0	6
Shale, gray		3	0
Sandstone, shaly		3	0
Coal, soft.....	2' 2 "		
Shale, gray	1 0		
Coal	0 2½		
Shale, gray	0 1		
Coal	0 2½		
Shale, gray	0 2		
Coal	0 6	4	4
Shale, sandy, to No. 2 Bas Bench.....		10	0

W. L. Walker Estate (W. Va. Timber Company Opening) Mine—No. 554 on Map II.

On north side of Twentymile Creek, at Vaughan; Campbell Creek

(Peerless) Coal; elevation, 850' B.

	Ft.	In.
1. Sandstone, massive, Monitor	20	0
2. Coal	0	6
3. Shale, sandy	6	0
4. Coal, soft	2' 4"	
5. Shale, gray	0 7	
6. Coal, soft.....	0 8	3 7
7. Slate, pavement		

A sample (No. 304R) was collected from No. 4 of section, the composition of which is published under **Mine No. 554** in the Survey Table of Coal Analyses at the end of this Chapter. Coal from the above opening is used for railroad fuel on the logging operations of the West Virginia Timber Company.

Coal Prospect—No. 555 on Map II.

On west side of Twentymile Creek, 0.3 mile east of Vaughan;
Campbell Creek (Peerless) Coal; elevation, 855' B.
Fallen shut, thickness unknown.

Lackawanna Coal & Lumber Company Prospect— No. 556 on Map II.

On south side of Lilly Branch of Twentymile Creek, 0.8 mile east of Vaughan; **Campbell Creek (Peerless) Coal**; elevation, 890' B.

	Ft.	In.
Coal, thickness concealed.....		
Concealed	10	0
Sandstone, Brownstown , to creek.....	10	0

Lackawanna Coal & Lumber Company Prospect— No. 557 on Map II.

On north side of Twentymile Creek, 1.0 mile N. 42° E. of Vaughan;
Campbell Creek (Peerless) Coal; elevation, 855' B.

	Ft.	In.
Sandstone, massive, Monitor	35	0
Shale, gray	1	0
Coal, medium-soft	2' 4"	
Coal, splinty	0 6	
Shale, gray	0 8	
Coal	0 6	
Slate, gray	0 9	
Coal	0 2	4 11
Fire clay shale and concealed to creek.....	15	0

Coal Exposure—No. 558 on Map II.

On north side of Twentymile Creek, 1.2 miles N. 49° E. of Vaughan; **Campbell Creek (Peerless) Coal**; elevation, 870' B. Coal, in railroad cut, thickness not determined.

Coal Prospect—No. 559 on Map II.

On north side of Twentymile Creek, 1.8 miles N. 69° E. of Vaughan; **Campbell Creek (Peerless) Coal**; elevation, 885' B. Fallen shut, thickness unknown.

Coal Prospect—No. 560 on Map II.

On north side of Twentymile Creek, 2.4 miles N. 72° E. of Vaughan; **Campbell Creek (Peerless) Coal**; elevation, 880' B. Fallen shut, thickness unknown.

Irvin Hughes Farm Mine—No. 561 on Map II.

On hillside south of Twentymile Creek, 4.1 miles S. 58° W. of Harriet; **Campbell Creek (Peerless) Coal**; elevation, 1180' B.

		Ft.	In.
1. Shale, gray, sandy.....		5	0
2. Coal, soft.....	1' 4"		
3. Coal, cannel bone.	0 8½		
4. Slate, gray	0 0½		
5. Coal	0 1		
6. Slate, gray	0 3		
7. Coal, splint	0 6		
8. Niggerhead	0 1		
9. Coal, splint	0 5	3	5
10. Slate, pavement			

A sample (No. 285R) was collected from Nos. 2, 7, and 9 of section, the composition of which is published under **Mine No. 561** in the Survey Table of Coal Analyses at the end of this Chapter.

Homer Hughes Heirs Farm Mine—No. 562 on Map II.

On hillside south of Twentymile Creek, 3.8 miles S. 60° W. of Harriet; **Campbell Creek (Peerless) Coal**; elevation, 1165' B.; for stratigraphic position and details, see Hardway Branch of Twentymile Section, page 111.

Lewis Coal & Land Company Exposure—No. 563 on Map II.

In ravine north of Twentymile Creek, 4.0 miles S. 65° W. of Harriet; Campbell Creek (Peerless) Coal; elevation, 1125' B.

	Ft.	In.
Coal, in run, 2' 0" to.....	3	0

Lewis Coal & Land Company Prospect—No. 564 on Map II.

In ravine south of Twentymile Creek, 3.2 miles S. 63° W. of Harriet; Campbell Creek (Peerless) Coal; elevation, 1055' B.
 Fallen shut, thickness unknown.

Lewis Coal & Land Company Prospect—No. 565 on Map II.

On east side of Boardtree Branch of Twentymile Creek, 2.8 miles S. 67° W. of Harriet; Campbell Creek (Peerless) Coal; elevation, 1045' B.

	Ft.	In.
Shale, sandy	7	0
Coal, soft	0	7"
Shale, gray	0	5
Coal, soft	0	6
Shale, gray	0	3
Coal	0	1
Shale, gray	0	6
Coal, soft	1	0
	3	4
Slate, pavement		

Lewis Coal & Land Company Exposure—No. 566 on Map II.

On north side of Twentymile Creek, 2.3 miles S. 59° W. of Harriet; Campbell Creek (Peerless) Coal; elevation, 1075' B.

	Ft.	In.
Sandstone, shaly		
Shale, sandy.....	8	0
Slate, black	1	6
Coal, soft	1	6"
Slate, gray	0	1
Coal	0	3
	1	10
Fire clay shale.....	2	0

**Lackawanna Coal & Lumber Company Prospect—
 No. 567 on Map II.**

In ravine north of Gauley River, 0.5 mile N. 51° W. of Swiss; Campbell Creek (Peerless) Coal; elevation, 1100' B.
 Fallen shut, thickness unknown.

Gauley Mountain Coal Company Buck Run (No. 1) Mine— No. 568 on Map II.

Falls District, Fayette County, on south side of Gauley River, 1.6 miles east of Belva; **Campbell Creek (Peerless) Coal**; elevation, 1075' B.

	Ft.	In.
1. Sandstone		
2. Draw slate.....	0	1
3. Coal, soft	2'	7"
4. Slate, gray	0	6
5. Coal, slaty	0	3
6. Coal, soft	0	9
7. Slate, pavement		

"Principal office, Ansted, W. Va.; coal owned by operating company; daily capacity, 500 tons; daily output, 400 tons; 40 miners and 35 laborers employed; electric haulage; coal shipped east for steam and domestic purposes; C. G. Williams, Mine Foreman, authority for data; sample No. 339R collected from Nos. 3 and 6 of section in pillar between Headings Nos. 4 and 5 of No. 2 Drift, for composition of which see Mine No. 568 in the Survey Table of Coal Analyses at the end of this Chapter."

Gauley Mountain Coal Company, No. 2 Mine— No. 569 on Map II.

Falls District, Fayette County, on east side of Rich Creek, ½ mile south of Jodie; **Campbell Creek (Peerless) Coal**; elevation, 1160' B.

	Ft.	In.
1. Slate, dark, with streaks of coal.....	1	0
2. Coal, slaty.....	0'	3 "
3. Coal, soft, good.....	3	1
4. Slate, bony	0	1½
5. Coal, soft	0	9½
6. Slate, pavement		

"Principal office, Ansted, W. Va.; coal owned by operating company; daily capacity, 150 tons (just in development stage); coal used for railroad fuel and also shipped south for city gas works; 20 miners and 12 laborers employed; butts, N. 40° E.; faces, N. 50° W.; greatest rise, southeast; electric haulage; E. L. Morris, Superintendent, authority for mine data; sample No. 338R collected from Nos. 3 and 5 of Section in No. 1 Heading, 1000 feet in, for composition of which see Mine No. 569 in the Survey Table of Coal Analyses at the end of this Chapter."

The two mines described above are both within less than one mile of the Nicholas Line and afford valuable information concerning the character of the coal, the entries having been driven underground beyond the zone of weathering.

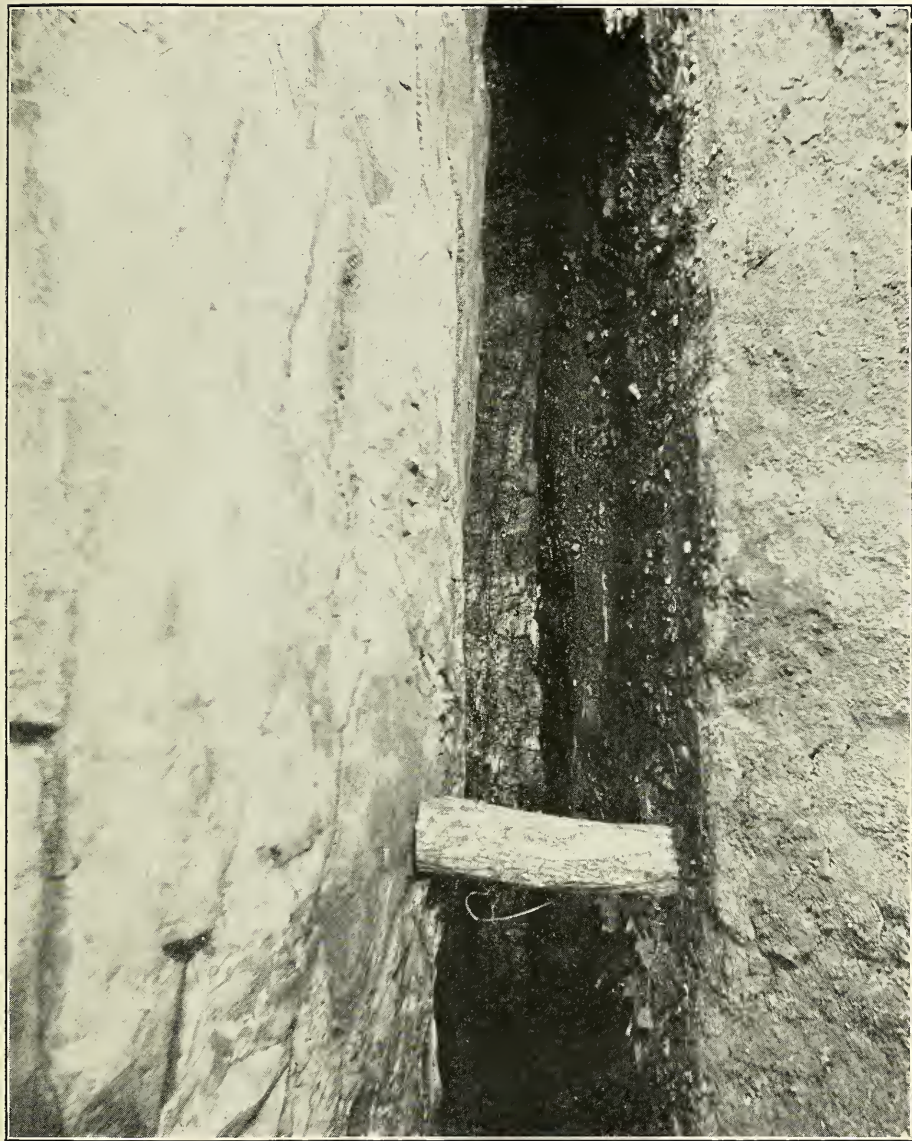


PLATE XXV. — Gilbert Coal beneath falls of Rockcamp Run (Exposure No. 978 on Map II); spars of coal are visible in base of Lower Gilbert Sandstone above main bed.

Photo by E. E. Harris.

Lackawanna Coal & Lumber Company Exposure—
No. 570 on Map II.

On Coal Hollow of Little Elk Creek, 1.8 miles N. 28° E. of Swiss;
Campbell Creek (Peerless) Coal; elevation, 1140' B.

	Ft.	In.
Slate, dark		
Coal	1	0
Sandstone		

Lackawanna Coal & Lumber Company Prospect—
No. 571 on Map II.

On Den Lick Fork of Laurel Creek, 1.6 miles S. 75° E. of Swiss;
Campbell Creek (Peerless) Coal; elevation, 1285' B.

	Ft.	In.
Coal, clean, reported by Miletus Simms (2' 0" to 3' 0" of blossom visible).....	4	6

Payne et al. Farm Mine—No. 572 on Map II.

On branch of Line Creek, 2.0 miles N. 4° W. of Lockwood; Camp-
bell Creek (Peerless) Coal; elevation, 1275' B.

	Ft.	In.
Sandstone, massive, Monitor.....	20	0
Shale, dark, 0' 0" to.....	0	6
Coal, splint	1	10
Slate, pavement		

Lackawanna Coal & Lumber Company Coal Blossom—
No. 573 on Map II.

In ravine east of Right Fork of Line Creek, 2.0 miles N. 49° E. of
Lockwood; Campbell Creek (Peerless) Coal; elevation, 1360' B.

Coal blossom, thickness unknown.

C. C. Sharp Prospect—No. 574 on Map II.

On east side of Right Fork of Line Creek, 1.9 miles N. 37° E. of
Lockwood; Campbell Creek (Peerless) Coal; elevation, 1320' B.

	Ft.	In.
1. Sandstone, massive, Monitor	20	0
2. Shale, gray	2	0
3. Coal, soft	2' 5"	
4. Shale, gray	0	4
5. Coal	0	6
6. Slate, gray, pavement		

A sample (No. 311R) was collected from No. 3 of section, the composition of which is published under **Mine No. 574** in the Survey Table of Coal Analyses at the end of this Chapter.

**Lackawanna Coal & Lumber Company Prospect—
No. 575 on Map II.**

On Right Fork of Line Creek, 2.5 miles N. 21° E. of Lockwood; **Campbell Creek (Peerless) Coal**; elevation, 1285' B.

	Ft.	In.
Shale, sandy		
Coal	0'	3½"
Slate, dark	0	0½
Coal, soft	1	6
Shale, gray.....	0	5
Coal, soft	0	5
	..... 2	8
Fire clay shale, pavement.....		

Flynn Lumber Company Prospect—No. 576 on Map II.

On north side of Bucklick Branch of Gauley River, 2.1 miles N. 60° W. of Vinton; **Campbell Creek (Peerless) Coal**; elevation, 1475' B.

	Ft.	In.
Shale, sandy, gray.....		
Coal, reported	2	6

Frank Johnson Farm Mine—No. 577 on Map II.

Near head of small north branch of Gauley River, 0.9 mile N. 15° W. of Vinton; **Campbell Creek (Peerless) Coal**; elevation, 1810' B. for stratigraphic position and details see Panther Mountain Section, page 115.

Campbell Creek (Peerless Bench) Coal, Grant District.

In Grant District the Campbell Creek (Peerless Bench) Coal crops on the waters of Twentymile and Peters Creeks, the following openings and exposures having been noted:

Lewis Coal & Land Company Prospect—No. 578 on Map II.

On north side of Twentymile Creek, 1.7 miles S. 55° W. of Harriet; **Campbell Creek (Peerless) Coal**; elevation, 1095' B.

	Ft.	In.
Sandstone, massive.....		
Slate, black	1	0
Coal, soft	1	4
Shale, gray, pavement.....		

Lewis Coal & Land Company Farm Mine—No. 579 on Map II.

On west hillside of Robinson Fork of Twentymile Creek, 1.7 miles S. 44° W. of Harriet; **Campbell Creek (Peerless) Coal**; elevation, 1110' B.

	Ft.	In.
1. Sandstone, massive, Monitor	25	0
2. Slate, black	1	6
3. Coal , medium-soft	2	0
4. Slate, pavement		

A sample (No. 295R) was collected from No. 3 of section, the composition of which is published under **Mine No. 579** in the Survey Table of Coal Analyses at the end of this Chapter.

Lewis Coal & Land Company Prospect—No. 580 on Map II.

On south side of Twentymile Creek, 1.4 miles S. 57° W. of Harriet; **Campbell Creek (Peerless) Coal**; elevation, 1100' B.

	Ft.	In.
Sandstone, massive, Monitor	20	0
Slate, black	1	6
Coal , medium-soft	1	6
Fire clay shale, pavement.....		

Lewis Coal & Land Company Prospect—No. 581 on Map II.

On hillside east of Twentymile Creek, 1.1 miles S. 70° W. of Harriet; **Campbell Creek (Peerless) Coal**; elevation, 1080' B.

	Ft.	In.
Sandstone, massive, Monitor	15	0
Slate, black	1	3
Coal	1	8
Slate, pavement		

Coal Blossom—No. 582 on Map II.

On hillside south of Twentymile Creek, 0.3 mile S. 29° W. of Harriet; **Campbell Creek (Peerless) Coal**; elevation, 1245' B.
Coal blossom, thickness unknown.

Coal Blossom—No. 583 on Map II.

In road, leading up Jerry Fork of Peters Creek, 2.7 miles west of Gilboa; **Campbell Creek (Peerless) Coal**; elevation, 1495' B.
Coal blossom, thickness unknown.

Coal Blossom—No. 584 on Map II.

On a short branch of Peters Creek, 0.6 mile northwest of Gilboa; **Campbell Creek (Peerless) Coal**; elevation, 1620' B.; for stratigraphic position, see Gilboa Section, page 123.

Coal blossom, thickness unknown.

Campbell Creek (Peerless Bench) Coal, Summersville District.

In Summersville District the Campbell Creek (Peerless Bench) Coal crops mainly on the waters of Peters and Muddlety Creeks, but has been prospected at only a few points, the following openings and exposures having been noted:

L. S. Grose Farm Mine—No. 585 on Map II.

On hillside west of Hutchinson Branch of Peters Creek, 0.7 mile north of Gilboa; **Campbell Creek (Peerless) Coal**; elevation, 1520' B.

	Ft.	In.
Shale, dark	5	0
Coal, soft.....0' 10"		
Slate, dark	0	2
Coal, soft	0	10
Slate, bony	0	1
Coal, splinty, cannel.....0 7	2	6

Slate, pavement

Coal Blossom—No. 586 on Map II.

At the head of Duffy Branch of Muddlety Creek, 1.4 miles N. 10° W. of Summersville; **Campbell Creek (Peerless) Coal**; elevation, 1980' B.

Coal blossom, thickness unknown.

Omar G. Robinson Prospect—No. 587 on Map II.

On west side of Muddlety Creek, 1.9 miles south of Muddlety village; **Campbell Creek (Peerless) Coal**; elevation, 1885' B.; for stratigraphic position see Fockler Branch of Muddlety Section, page 129.

	Ft.	In.
Coal, reported	3	0

Campdell Creek (Peerless Bench) Coal, Hamilton District.

In Hamilton District the Campbell Creek (Peerless

Bench) Coal, crops along Birch River, and on Glade Creek, Phillips Run, and McMillion Creek, the latter three streams being tributary to Muddlety Creek, and on Persinger Creek. In these localities it has been prospected and mined at numerous points for local domestic use, many of the mines having fallen shut. The following openings and exposures were noted:

Coal Blossom—No. 588 on Map II.

On hillside west of Anthony Creek, 1.2 miles S. 75° E. of Birch River village; **Campbell Creek (Peerless) Coal**; elevation, 1215' B., for stratigraphic position, see Mouth of Anthony Creek Section, page 142. **Coal blossom**, thickness unknown.

Asa Cunningham Farm Mine—No. 589 on Map II.

On south side of Birch River, 0.4 mile west of Skyles; **Campbell Creek (Peerless) Coal**; elevation, 1355' B.

	Ft.	In.
Fallen shut, coal, with parting, reported.....	3	0

Coal Prospect—No. 590 on Map II.

On hillside north of Birch River, 0.4 mile west of Skyles; **Campbell Creek (Peerless) Coal**; elevation, 1330' B.; observation by Price. Fallen shut, thickness unknown.

Several openings have been made along Barnet Run of Birch River, just across the line in Webster County, the following being representative of the coal in that region, there being no outcrop in the adjoining portion of Nicholas:

James Holmes Farm Mine—No. 591 on Map II.

On east side of Barnet Run of Birch River, 1.2 miles S. 35° W. of Boggs; **Campbell Creek (Peerless) Coal**; elevation, 1810' B.

	Ft.	In.
Slate, black		
Coal, laminated .....	.0'	6"
Coal, soft	2	6
	3	0
Slate, pavement		

Chas. M. Hamilton Farm Mine—No. 592 on Map II.

On a branch of Glade Creek, 3.9 miles N. 58° E. of Summersville;

Campbell Creek (Peerless) Coal; elevation, 2205' B.; observation by Price.

	Ft.	In.
Fallen shut, coal, reported.....	2	6

J. R. Cottle Farm Mine—No. 593 on Map II.

On a short branch of Phillips Run, 2.3 miles S. 41° E. of Muddety; **Campbell Creek (Peerless) Coal**; elevation, 2075' B.; observation by Price.

	Ft.	In.
Fallen shut, coal, reported.....	2	6

G. A. McMillion Farm Mine—No. 594 on Map II.

On a branch of Phillips Run, 1.1 miles S. 29° E. of Kirkwood; **Campbell Creek (Peerless) Coal**; elevation, 2110' B.; observation by Price.

	Ft.	In.
Sandstone and shale.....	2	0
Coal, reported 2' 0" to.....	4	0

Coal Blossom—No. 595 on Map II.

Along road at head of Phillips Run, 0.5 mile N. 6° W. of Kirkwood; **Campbell Creek (Peerless) Coal**; elevation, 1955' B.; observation by Price.

Coal blossom, thickness unknown.

John M. Herold Farm Mine—No. 596 on Map II.

In road on north side of McMillion Creek, 1.5 miles N. 70° E. of Muddety; **Campbell Creek (Peerless) Coal**; elevation, 1870' B.; observation by Price.

Abandoned, thickness unknown.

David McQueen Farm Mine—No. 597 on Map II.

On hillside south of McMillion Creek, 1.2 miles N. 54° E. of Kirkwood; **Campbell Creek (Peerless) Coal**; elevation, 1950' B.

Fallen shut, thickness unknown.

A. M. C. Hutchinson Farm Mine—No. 598 on Map II.

On a branch of McMillion Creek, 0.9 mile N. 25° E. of Opal; **Campbell Creek (Peerless) Coal**; elevation, 1970' B.; observation by Price.

	Ft.	In.
Shale, black, fissile, sandy, visible.....	1	0
Coal, visible	0	8
Concealed in water, thickness unknown.....		

Ira Mays Farm Mine—No. 599 on Map II.

On hillside east of Persinger Creek, 0.6 mile S. 84° E. of Persinger; **Campbell Creek (Peerless) Coal**; elevation, 2320' B.; observation by Price.

Fallen shut, thickness unknown.

A. D. Grose Farm Mine—No. 600 on Map II.

At the head of a short branch of Persinger Creek, 0.7 mile N. 68° E. of Persinger; **Campbell Creek (Peerless) Coal**; elevation, 2400' B.

	Ft.	In.
Fallen shut, coal, reported, 1' 6" to.....	2	6

Campbell Creek (Peerless Bench) Coal, Beaver District.

In Beaver District the Campbell Creek (Peerless Bench) Coal crops mainly in the high ridges lying north of the Summersville and Slaven Cabin Road, having been prospected at only a few points. The following openings were noted:

Smoot Lumber Company Prospect—No. 601 on Map II.

At the head of a branch of Crooked Run of Gauley River, 1.3 miles S. 69° E. of Persinger; **Campbell Creek (Peerless) Coal**; elevation, 2410' B.

	Ft.	In.
Fallen shut, coal, cannel, reported.....	2	0

Andrew Mullens Farm Mine—No. 602 on Map II.

On a short branch of Little Beaver Creek, 0.9 mile northeast of Calvin; **Campbell Creek (Peerless) Coal**; elevation, 2210' B.

	Ft.	In.
Coal, visible (partly fallen shut, mined by stripping)...	2	0

Coal Prospect—No. 603 on Map II.

On east side of Cottle Knob, 1.8 miles west of Allingdale; **Campbell Creek (Peerless) Coal**; elevation, 2358' B.; for stratigraphic position see Camden-on-Gauley Section, page 153.

Fallen shut, thickness unknown.

Campbell Creek (Peerless Bench) Coal, Kentucky District.

In Kentucky District the Campbell Creek (Peerless

Bench) Coal crops only in the high ridge lying south of Gauley River between Persinger Ford and Brocks Bridge. So far as known no prospects have been made in this locality, and while the blossom of the coal is visible at a few points its thickness is only a matter of conjecture.

Quantity of Campbell Creek (Peerless Bench) Coal Available.

The following table, compiled by Tucker, from a planimetric measurement of the crop as limited on Figure 15, shows the probable amount of Campbell Creek (Peerless Bench) Coal in the County:

Probable Amount of Campbell Creek (Peerless Bench) Coal.

District	Thickness of Coal Assumed Feet	Square Miles	Acres	Cubic Feet of Coal	Short Tons of Coal
Jefferson	2.5	49.40	31,616	3,442,982,400	137,719,296
Grant	2.0	20.40	13,056	1,137,438,720	45,497,549
Summersville	2.0	33.80	21,632	1,884,579,840	75,383,194
Hamilton	2.0	82.65	52,896	4,608,299,520	184,331,981
Beaver	1.5	19.40	12,416	811,261,440	32,450,458
Kentucky	1.5	0.15	96	6,272,640	250,905
Totals .....	.....	205.80	131,712	11,890,834,560	475,633,383

CAMPBELL CREEK (NO. 2 GAS BENCH) COAL.

The Campbell Creek (No. 2 Gas Bench) Coal, previously discussed in Chapter VI, page 272, outcrops generally over the northern half of the county, except along the headwaters of certain streams where it lies under drainage. South of Gauley River it is found only in a few high, isolated ridges, southeast of Summersville, its horizon elsewhere being above the hill-tops. As a rule it is multiple-bedded, soft and gaseous, varying in thickness from 2 to 5 feet. In quality it is a very pure gas coal, being exceedingly low in ash, low in sulphur and phosphorus, and high in volatile matter and British Thermal Units, but the several shale partings that almost invariably

Campbell Creek (No. 2 Gas Bench) Coal, Jefferson District.

In Jefferson District the Campbell Creek (No. 2 Gas Bench) Coal crops on the waters of Twentymile, Little Elk, and Peters Creeks, and on Gauley River, the following openings and exposures having been noted:

Greenbrier Coal Company Prospect—No. 604 on Map II.

On east side of Bells Creek, 0.7 mile N. 33° E. of Belva; **Campbell Creek (No. 2 Gas) Coal**; elevation, 840' B.

	Ft.	In.
Sandstone		
Shale, gray, sandy	4	0
Coal, soft	1' 6"	
Shale, gray	0	1
Slate, black, bony.....	0	3
Coal, hard	0	3
	2	1
Slate, pavement		

Coal Exposure—No. 605 on Map II.

On east side of Twentymile Creek, 0.3 mile S. 29° E. of Vaughan; **Campbell Creek (No. 2 Gas) Coal**; elevation, 805' B.

	Ft.	In.
Sandstone, shaly		
Coal, medium-soft	1	9
Shale, gray, and concealed	5	0
Sandstone to creek	3	0

Chesapeake & Ohio Railway Exposure—No. 606 on Map II.

On west side of Twentymile Creek, 0.2 mile south of Vaughan; **Campbell Creek (No. 2 Gas) Coal**; elevation, 830' B.

	Ft.	In.
Sandstone, massive	10	0
Coal	0	6
Fire clay shale	4	0

Eagle Gas Coal Company Exposure—No. 607 on Map II.

On west side of Twentymile Creek, 0.1 mile south of Vaughan; **Campbell Creek (No. 2 Gas) Coal**; elevation, 823' B.

	Ft.	In.
Shale, sandy (from Peerless Coal)	10	0
Coal	0' 7"	
Slate, dark	0	5
Coal	0	10
	1	10

Lewis Coal & Land Company Prospect—No. 608 on Map II.

On south side of Twentymile Creek, 3.8 miles southwest of Harriet; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1155' B.; for stratigraphic position see Hardway Branch of Twentymile Section, page 112.

	Ft.	In.
Fallen shut, coal, reported.....	3	0

Lewis Coal & Land Company Exposure—No. 609 on Map II.

In ravine north of Twentymile Creek, 3.9 miles S. 63° W. of Harriet; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1110' B.

	Ft.	In.
Shale, sandy		
Slate, black, cancell.....	0	10
Coal, medium-hard	0	10
Shale, gray, with plant fossils.....		

Lewis Coal & Land Company Exposure—No. 610 on Map II.

On south side of Twentymile Creek, 3.5 miles S. 64° W. of Harriet; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1020' B.

	Ft.	In.
Sandstone, massive		
Coal	0	1"
Slate	0	3
Coal	2	0
	2	4
Shale, sandy	3	0

Gauley Mountain Coal Company (Buck Run No. 1) Mine—No. 611 on Map II.

In Falls District, Fayette County, in ravine on south side of Gauley River, 1.2 miles due east of Wyndal; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1085' B.

	Ft.	In.
1. Slate, dark		
2. Coal, cancell	0	2"
3. Coal, soft	1	3
4. Slate, bony	0	3
5. Coal, soft	1	0
6. Slate, gray, 0' 0½" to.....	0	1
7. Coal, soft	2	8
	5	5
8. Slate, pavement		

"Principal office, Ansted, W. Va.; coal owned by operating company; butts, N. 40° E.; faces, N. 50° W.; greatest rise, southeast; electric haulage; for capacity, labor, etc., see data on Mine No. 568, page 584, the two drifts being operated as one mine; sample No. 340R collected from Nos. 3, 5, and 7 of section in Room No. 2, Fourth Left Heading, for composition of which see Mine No. 611 in the Survey Table of Coal Analyses at the end of this Chapter."

Livengood Heirs Prospect—No. 612 on Map II.

In ravine north of Gauley River, 1.3 miles S. 79° W. of Swiss;
Campbell Creek (No. 2 Gas) Coal; elevation, 940' B.

	Ft.	In.
Shale, gray	10	6
Shale, ferruginous	1	0
Coal, slaty, roof.....	0' 10"	
Coal, soft	2	0
Slate, gray	0	4
Coal	0	6
Shale, gray	0	9
Coal	1	5
	5	10
Slate, pavement		

Lackawanna Coal & Lumber Company Prospect— No. 613 on Map II.

On south side of Little Elk Creek, 1.1 miles N. 46° E. of Swiss;
Campbell Creek (No. 2 Gas) Coal; elevation, 1115' B.

	Ft.	In.
Sandstone, massive	15	0
Shale, gray and sandy.....	4	0
Coal, soft, platy.....	0' 8"	
Coal, splinty	1	3
Coal, soft	0	7
Shale, gray, 0' 3" to.....	0	2
Coal, splinty	0	10
	3	6
Slate, pavement		

Coal Blossom—No. 614 on Map II.

East side of Den Lick Fork of Laurel Creek, 1.6 miles S. 83° E.
of Swiss; Campbell Creek (No. 2 Gas) Coal; elevation, 1255' B.
Coal blossom, at tree root, heavy.

Lackawanna Coal & Lumber Company Farm Mine (Swartz Bros. Opening)—No. 615 on Map II.

On a short branch of Laurel Creek, 3.1 miles N. 85° E. of Swiss;
Campbell Creek (No. 2 Gas) Coal; elevation, 1630' B.

	Ft.	In.
Shale, sandy		
Sandstone, shaly	2	0
Coal	0' 5"	
Slate, dark	2	0
Coal	0	5
Slate	0	2
Coal	0	9
Slate, with streak of coal.....	1	3

		Ft.	In.
Coal, slaty	0' 11"		
Slate	0 1		
Coal	0 7	6	7
<hr/>			
Slate, pavement			

Flynn Lumber Company (George Johnson Opening) Farm Mine—No. 616 on Map II.

On north side of Otter Creek, 1.1 miles N. 66° W. of Lockwood; Campbell Creek (No. 2 Gas) Coal; elevation, 1370' B.
Fallen shut, thickness unknown.

Flynn Lumber Company Farm Mine—No. 617 on Map II.

On north side of Otter Creek, 1.0 mile N. 65° W. of Lockwood; Campbell Creek (No. 2 Gas) Coal; elevation, 1375' B.

		Ft.	In.
Slate			
Coal, soft	1' 3"		
Slate, dark	0 3		
Coal	0 6		
Slate, gray	0 3		
Coal, medium-soft	1 9	4	0
<hr/>			
Slate			

Coal Prospect—No. 618 on Map II.

On a northern branch of Line Creek, 1.8 miles N. 85° W. of Lockwood; Campbell Creek (No. 2 Gas) Coal; elevation, 1245' B.

	Ft.	In.
Sandstone, massive	10	0
Shale, gray, sandy, visible.....	2	0
Concealed, coal, and black slate on dump, thickness unknown		

Lorenzo Dorsey Prospect—No. 619 on Map II.

On west side of Tate Run of Peters Creek, 0.6 mile N. 73° W. of Drennen; Campbell Creek (No. 2 Gas) Coal; elevation, 1405' B.
Fallen shut, thickness unknown.

J. F. Cavendish Farm Mine—No. 620 on Map II.

On ridge north of Gauley River, 1.1 miles N. 10° E. of Albion; Campbell Creek (No. 2 Gas) Coal; elevation, 1760' B.

		Ft.	In.
Coal, gas, medium-soft.....	0' 9"		
Shale, gray	1' 3"		
Coal	0 1	}	1 9
Shale, gray	0 5		
Coal, gas, medium-soft.....	0 6		
Bone, sulphur	0 2		
Coal, gas, medium-soft.....	1 3	4	5

Frank Johnson Farm Mine—No. 621 on Map II.

On ridge north of Gauley River, 0.7 mile N. 5° W. of Vinton; Campbell Creek (No. 2 Gas) Coal; elevation, 1750' B.

		Ft.	In.
1. Sandstone, massive			
2. Slate		1	0
3. Coal	0' 6 "		
4. Shale, gray	0 10		
5. Coal	0 1		
6. Slate, dark	0 6		
7. Coal, soft	0 9½		
8. Slate, black	0 0½		
9. Coal, soft	1 4		
10. Slate	1 0		
11. Coal	0 8	5	9
12. Slate, pavement			

A sample (No. 315R) was collected from Nos. 7 and 9 of section, the composition of which is published under Mine No. 621 in the Survey Table of Coal Analyses at the end of this Chapter.

Dora Mason Farm Mine—No. 622 on Map II.

On ridge north of Gauley River, 0.8 mile north of Vinton; Campbell Creek (No. 2 Gas) Coal; elevation, 1760' B.

		Ft.	In.
Sandstone, massive			
Coal	0' 6"		
Slate, gray	0 9		
Coal	0 1		
Shale, dark	0 6		
Coal	0 9		
Slate, dark	0 1		
Coal, soft	1 3	3	11
Slate, pavement			

Campbell Creek (No. 2 Gas Bench) Coal, Grant District.

In Grant District the Campbell Creek (No. 2 Gas Bench) Coal has been prospected mainly on certain tributaries of

Peters Creek, being under drainage farther north and passing above the hilltops along the Gauley front. The following openings and exposures were noted:

John Brown Prospect—No. 623 on Map II.

On ridge south of Laurel Creek, 0.9 mile southeast of Poe; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1860' B.
 Fallen shut, thickness unknown.

Coal Blossom—No. 624 on Map II.

On north side of Laurel Creek, 1.7 miles N. 31° E. of Poe; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1760' B.
 Coal blossom, thickness unknown.

Freemont Pearson Farm Mine—No. 625 on Map II.

On east side of Whitewater Branch of Peters Creek, 0.4 mile N. 71° E. of Burl; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1750' B.

	Ft.	In.
1. Sandstone, massive.....		
2. Coal, soft.....	1'	7"
3. Coal, slaty.....	0	2
4. Coal, soft.....	0	11
5. Slate, gray.....	0	4
6. Coal, soft.....	1	1
	4	1
7. Slate, pavement.....		

A sample (No. 320R) was collected from Nos. 2, 4, and 6 of section, the composition of which is published under **Mine No. 625** in the Survey Table of Coal Analyses at the end of this Chapter.

Walter Ford Farm Mine—No. 626 on Map II.

On east side of Whitewater Branch of Peters Creek, 0.6 mile S. 65° E. of Burl; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1785' B.

	Ft.	In.
Sandstone, massive		
Coal, soft	1'	6"
Slate, bony	0	1
Coal, soft	0	1
Shale, gray	1	8
Coal, soft	0	11
	4	3
Slate, pavement(?)		

Jacob Sebert Prospect—No. 627 on Map II.

On south side of Whitewater Branch of Peters Creek, 1.0 mile S. 26° E. of Burl; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1790' B.

	Ft.	In.
Sandstone, broken		
Slate	0	6
Coal, estimated on slope, 3' 0" to.....	4	0

Coal Prospect—No. 628 on Map II.

On road leading north between Ray and Hutchinson Branches of Peters Creek, 0.6 mile N. 48° W. of Gilboa; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1580' B.; for stratigraphic position see Gilboa Section, page 123.

Fallen shut, thickness unknown.

Campbell Creek (No. 2 Gas Bench) Coal Summersville District.

In Summersville District the Campbell Creek (No. 2 Gas Bench) Coal has been prospected and mined for local domestic fuel on the waters of Peters and Muddlety Creeks. At the northern end of the district it is under drainage and at the southern end its horizon belongs above the hilltops. The following openings were noted:

John Hypes Farm Mine—No. 629 on Map II.

On hillside west of Buckgarden Creek, 1.8 miles N. 20° E. of Gilboa; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1620' B.

	Ft.	In.
1. Sandstone, massive		
2. Coal, soft	0' 5"	
3. Slate, gray	0	1
4. Coal	0	1
5. Slate, gray	0	6
6. Coal, soft	0	5
7. Slate, bony	0	2
8. Coal, soft	1	1
9. Slate, pavement	2	9

A sample (No. 275R) was collected from Nos. 2, 6, and 9 of section, the composition of which is published under **Mine No. 629** in the Survey Table of Coal Analyses at the end of this Chapter.

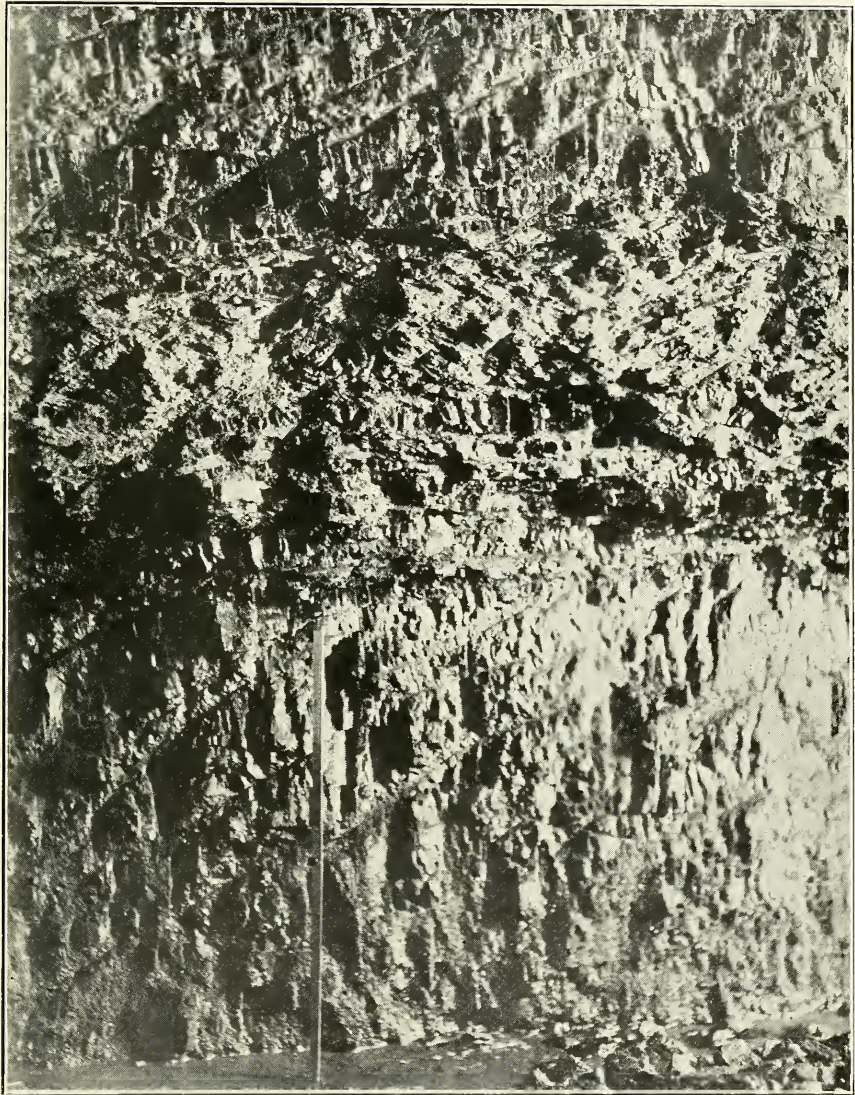


Photo by E. E. Harris.

PLATE XXVI. — Gilbert Coal at Mary Boiler Mine
(No. 951 on Map II), near Sparks; large bony parting just
above two-foot rule is typical of seam.

Moses Neal Prospect—No. 630 on Map II.

On hillside east of a north branch of Pine Run, 1.6 miles N. 52° E. of Enon; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1790' B.

The above opening was reported by Mr. Moses Neal, subsequent to the writer's visit to this locality, his statement being that it was about 50 feet above the Eagle Coal which in the same hillside has an elevation of 1740' B. The thickness of the coal was not reported.

Austin Bryant Farm Mine—No. 631 on Map II.

On north side of Bryant Branch of Peters Creek, 2 miles eastward from Enon; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1820' B.

	Ft.	In.
Sandstone, massive		
Shale, gray	1	0
Coal, soft	1'	0"
Shale, gray	0	3
Coal	0	5
Slate, gray	0	2
Coal, soft.....	1	2
	<hr/>	
Slate, pavement	3	0

Austin Bryant Farm Mine—No. 632 on Map II.

On Bryant Branch of Peters Creek, 2.2 miles N. 83° E. of Enon; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1880' B.

	Ft.	In.
Sandstone, massive		
Coal, (fallen shut), reported 3' 0" to.....	3	6

Austin Bryant Farm Mine—No. 633 on Map II.

On south side of Bryant Branch of Peters Creek, 2.1 miles N. 85° E. of Enon; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1885' B.
Fallen shut, thickness unknown.

Geo. H. Alderson Exposure—No. 634 on Map II.

At extreme head of Peters Creek, 0.5 mile N. 25° E. of Summersville; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1990' B.

	Ft.	In.
Shale, sandy	5	0
Coal, reported	1	4
Shale, gray, sandy	19	0
Coal, reported	1	4

At this point it appears that No. 2 Gas Coal is split into two benches, separated by 19 feet of shale.

M. C. Duffy Farm Mine—No. 635 on Map II.

On a short branch of Duffy Branch of Muddlety Creek, 2.1 miles north of Summersville; Campbell Creek (No. 2 Gas) Coal; elevation, 1870' B.

	Ft.	In.
Fallen shut, coal, reported.....	4	0

Flynn Lumber Company Farm Mine—No. 636 on Map II.

On a short branch of Duffy Branch of Muddlety Creek, 2.2 miles N. 3° W. of Summersville; Campbell Creek (No. 2 Gas) Coal; elevation, 1870' B.

	Ft.	In.
1. Slate, dark		
2. Coal, soft, gas.....1' 3"		
3. Shale, gray	0	3
4. Coal, soft, gas.....0 5		
5. Slate, dark	0	1
6. Coal, soft, gas.....1 7	3	7
7. Slate, pavement		

A sample (No. 250R) was collected from Nos. 2, 4, and 6 of section, the composition of which is published under Mine No. 636 in the Survey Table of Coal Analyses at the end of this Chapter.

H. W. Herold Farm Mine—No. 637 on Map II.

On west side of Muddlety Creek, 2.5 miles south of Muddlety; Campbell Creek (No. 2 Gas) Coal; elevation, 1890' B.

	Ft.	In.
1. Shale, sandy		
2. Coal, soft	1'	2"
3. Slate, bony	0	4
4. Coal, soft	0	5
5. Slate, bony	0	2
6. Coal, soft	1 11	4 0
7. Slate, pavement		

A sample (No. 254R) was collected from Nos. 2, 4, and 6 of section, the composition of which is published under Mine No. 637 in the Survey Table of Coal Analyses at the end of this Chapter.

Omar G. Robinson Farm Mine—No. 638 on Map II.

Just beneath road on west side of Muddlety Creek, 1.8 miles south of Muddlety; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1855' B.; for stratigraphic position and details see Fockler Branch of Muddlety Section, page 129.

Campbell Creek (No. 2 Gas Bench) Coal, Hamilton District.

In Hamilton District the **Campbell Creek (No. 2 Gas Bench) Coal** crops mainly on Muddlety Creek, including Glade Creek, Phillips Run, and McMillion Creek, all tributary to the same, and in the high ridge north of Gauley River, and on Persinger Creek. The following openings and exposures, most of which were visited by Dr. Price, were noted:

C. M. Hamilton Farm Mine—No. 639 on Map II.

On a branch of Jones Run of Glade Creek, 1.8 miles S. 78° W. of Persinger; **Campbell Creek (No. 2 Gas) Coal**; elevation, 2200' B.; observation by Price; fallen shut, reported as follows:

	Ft.	In.
Sandstone, massive		
Shale, and coal, mixed.....3' 0"		
Coal .....2 4	5	4

C. M. Hamilton Farm Mine—No. 640 on Map II.

At source of Ewing Run of Glade Creek, 1.9 miles S. 67° W. of Persinger; **Campbell Creek (No. 2 Gas) Coal**; elevation, 2190' B.; observation by Price; fallen shut, reported as follows:

	Ft.	In.
Coal and shale mixed.....3' 0"		
Coal .....2 4	5	4

Scott Bobbitt Farm Mine—No. 641 on Map II.

On a branch of Jones Run of Glade Creek, 1.5 miles S. 82° W. of Persinger; **Campbell Creek (No. 2 Gas) Coal**; elevation, 2220' B.; observation by Price.

	Ft.	In.
Fallen shut, coal, reported.....	2	6

A. B. Morrison Farm Mine—No. 642 on Map II.

On hillside south of Jones Run of Glade Creek, 1.2 miles S. 86° W. of Persinger; Campbell Creek (No. 2 Gas) Coal; elevation, 2215' B.; observation by Price.

	Ft.	In.
Shale		
Coal, estimated	1'	4"
Shale, estimated	1	6
Concealed in water, coal, reported.....	2	4
	5	2

A. B. Morrison Farm Mine—No. 643 on Map II.

On hillside south of Jones Run of Glade Creek, 1.1 miles S. 81° W. of Persinger; Campbell Creek (No. 2 Gas) Coal; elevation, 2230' B.; observation by Price.

	Ft.	In.
Shale		
Bone	0	2
Coal, soft	1'	2 "
Shale, soft	1	0½
Coal	0	0¾
Shale	0	0¾
Coal, two shale streaks.....	0	5½
Shale	0	1½
Coal, soft.....	1	8
	4	7
Shale		

Wm. J. Rapp Farm Mine—No. 644 on Map II.

On ridge north of Jones Run of Glade Creek, 0.9 mile N. 76° W. of Persinger; Campbell Creek (No. 2 Gas) Coal; elevation, 2180' B.; observation by Price.

	Ft.	In.
Shale		
Coal	1'	3"
Shale	1	6
Coal	2	6
	5	3
Shale		

M. C. Woods Farm Mine—No. 645 on Map II.

On the south side of Glade Creek, 1.3 miles N. 31° W. of Persinger; Campbell Creek (No. 2 Gas) Coal; elevation, 2125' B.; observation by Price.

	Ft.	In.
1. Shale		
2. Coal, soft	1'	2½"
3. Shale, with coal lenses.....	1	4
4. Coal	0	5

		Ft.	In.
5. Niggerhead	0' 1½"		
6. Coal, medium-hard with paper-thin shale partings.....	1 10	4	11
7. Shale, pavement			

A sample (No. 5P) was collected from Nos. 2, 4, and 6 of section, the composition of which is published under **Mine No. 645** in the Survey Table of Coal Analyses at the end of this Chapter.

W. P. Milam Farm Mine—No. 646 on Map II.

On the head of Glade Creek, 1.5 miles north of Persinger; **Campbell Creek (No. 2 Gas) Coal**; elevation, 2070' B.; observation by Price.

		Ft.	In.
Shale, gray, plant fossils.....			
Coal, bony	0' 1½"		
Coal	1 2		
Shale, soft, gray.....	1 10		
Coal, visible	0 6½		
Coal, reported	2 0	5	8
Concealed			

W. H. Fitzwater Farm Mine—No. 547 on Map II.

On a branch of Phillips Run of Muddlety Creek, 2.8 miles S. 29° E. of Muddlety; **Campbell Creek (No. 2 Gas) Coal**; elevation, 2095' B.; observation by Price.

Fallen shut, thickness unknown.

S. D. McClung Farm Mine—No. 648 on Map II.

On north side of Phillips Run of Muddlety Creek, 1.5 miles S. 31° E. of Muddlety; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1895' B.; observation by Price; fallen shut, reported as follows:

		Ft.	In.
Shale, soft, gray.....			
Shale, draw	0		8
Coal, soft (0' 2" binder near middle).....	4		0

J. R. Cottle Farm Mine—No. 649 on Map II.

On north side of Phillips Run of Muddlety Creek, 1.4 miles S. 50° E. of Muddlety; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1890' B.; observation by Price.

		Ft.	In.
Coal, visible.....	2		0

Ed. Tyree Farm Mine—No. 650 on Map II.

On north side of Phillips Run of Muddlety Creek, 1.5 miles S. 59° E. of Muddlety; Campbell Creek (No. 2 Gas) Coal; elevation, 1880' B.; observation by Price.

		Ft.	In.
Shale			
Coal, dirty.....	0' 10"		
Shale, soft	0	0½	
Coal, soft, dirty.....	0	7½	
Shale, soft	0	0½	
Coal, soft	1	8	3 2½

H. A. McClung Farm Mine—No. 651 on Map II.

On north side of Phillips Run of Muddlety Creek, 1.5 miles S. 71° E. of Muddlety; Campbell Creek (No. 2 Gas) Coal; elevation, 1925' B.; observation by Price.

		Ft.	In.
Shale			
Coal and shale.....	0' 1½"		
Coal, dirty	1	6	
Shale	0	2	
Coal, hard	1	7½	3 5
Shale			

Homer H. Spinks Farm Mine—No. 652 on Map II.

On south side of Phillips Run of Muddlety Creek, just south of Kirkwood; Campbell Creek (No. 2 Gas) Coal; elevation, 1975' B.; observation by Price.

Fallen shut, thickness unknown.

E. A. McClung Farm Mine—No. 653 on Map II.

On a branch of Phillips Run, 0.4 mile N. 45° E. of Kirkwood; Campbell Creek (No. 2 Gas) Coal; elevation, 1935' B.; observation by Price.

		Ft.	In.
Shale			
Coal, soft, with paper-thin parting.....	0' 10"		
Shale and coal.....	0	2	
Coal, soft, dirty.....	0	6	
Shale, soft	0	2	
Coal, soft	1	9	3 5
Shale, pavement			

E. A. McClung Farm Mine—No. 654 on Map II.

On a branch of Phillips Run, 0.5 mile N. 45° E. of Kirkwood; Campbell Creek (No. 2 Gas) Coal; elevation, 1930' B.; observation by Price.

Fallen shut, thickness unknown.

John Rader Farm Mine—No. 655 on Map II.

On east side of Muddlety Creek, 1.5 miles S. 28° E. of Muddlety; Campbell Creek (No. 2 Gas) Coal; elevation, 1875' B.; observation by Price.

	Ft.	In.
Shale		
Coal, soft	0'	6½"
Coal, soft, with three or four ½" part-ings	0	5½
Coal, soft	0	2
Shale, dark	0	1½
Coal, soft.....	1	11½
	3	3
Shale		

John M. Herold Farm Mine—No. 656 on Map II.

On north side of McMillion Creek, 1.8 miles N. 15° E. of Muddlety; Campbell Creek (No. 2 Gas) Coal; elevation, 1885' B.; observation by Price.

	Ft.	In.
Soil, top not seen.....		
Coal, medium-hard	1'	4"
Coal, soft	0	1
Coal, bony	0	1
	1	6
Shale		

Coal Exposure—No. 657 on Map II.

In road south of McMillion Creek, 0.8 mile N. 10° W. of Kirkwood; Campbell Creek (No. 2 Gas) Coal; elevation, 1925' B.; observation by Price.

	Ft.	In.
Coal, in road, base exposed, but not top.....	2	0

John M. Herold Farm Mine—No. 658 on Map II.

In road south of McMillion Creek, 0.8 mile N. 17° W. of Kirkwood; Campbell Creek (No. 2 Gas) Coal; elevation, 1915' B.

	Ft.	In.
Shale		
Coal, soft	0'	2½"
Coal, bony cannel.....	0	3
Coal, hard	1	11
	2	4½

K. B. McCue Farm Mine—No. 659 on Map II.

On north side of McMillion Creek, 2.6 miles N. 77° E. of Mud-
dlety; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1880' B.

	Ft.	In.
Shale, soft, light.....		
Coal, soft, 2 or 3 paper-thin partings....	1	6"
Shale	0	1½
Coal, visible	1	3½
	2	11

Coal, concealed in water.....

David McQueen Coal Stripping—No. 660 on Map II.

On north side of McMillion Creek, 3.0 miles N. 79° E. of Mud-
dlety; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1875' L.

	Ft.	In.
Coal stripping, reported, roof not seen.....	2	0

K. B. McCue Farm Mine—No. 661 on Map II.

On a branch of McMillion Creek, 2.1 miles N. 58° E. of Kirkwood;
Campbell Creek (No. 2 Gas) Coal; elevation, 1905' B.; observation by
Price.

Fallen shut, thickness unknown.

K. B. McCue Farm Mine—No. 662 on Map II.

On a branch of McMillion Creek, 2.2 miles N. 60° E. of Kirk-
wood; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1915' B.; observa-
tion by Price.

	Ft.	In.
Sandstone		
Coal, reported about.....	2	0
Sandstone		

K. B. McCue Farm Mine—No. 663 on Map II.

On south side of McMillion Creek, 1.7 miles N. 67° E. of Kirk-
wood; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1930' L.; observa-
tion by Price.

	Ft.	In.
Coal, (roof not seen), about.....	1	6

K. B. McCue Coal Blossom—No. 664 on Map II.

On south side of McMillion Creek, 1.6 miles N. 75° E. of Kirk-
wood; **Campbell Creek (No. 2 Gas) Coal**; elevation, 1945' B.; observa-
tion by Price.

Coal blossom, thickness unknown.

K. B. McCue Farm Mine—No. 665 on Map II.

On a branch of McMillion Creek, 2.6 miles east of Kirkwood; Campbell Creek (No. 2 Gas) Coal; elevation, 2045' B.; observation by Price.

	Ft.	In.
Sandstone, shaly	8	0
Shale, sandy	2	0
Shale, fissile, bituminous, coal streaks.....	0	5
Shale, soft, clayey.....	0	9
Coal, soft, dirty.....0' 5½"		
Shale, soft	0	1½
Coal, hard	0	9
Coal, concealed in water.....1 0	2	4

Coal Blossom—No. 666 on Map II.

At extreme head of McMillion Creek, 0.9 mile N. 75° W. of Calvin; Campbell Creek (No. 2 Gas) Coal; elevation, 2210' B.; observation by Reger and Price.

	Ft.	In.
Coal blossom, visible.....	1	0

A. B. Morrison Farm Mine—No. 667 on Map II.

On hillside north of Gauley River, 1.8 miles S. 57° W. of Persinger; Campbell Creek (No. 2 Gas) Coal; elevation, 2245' B.; observation by Reger and Price.

Fallen shut, thickness unknown.

A. B. Morrison Farm Mine—No. 668 on Map II.

On hillside north of Gauley River, 1.6 miles S. 55° W. of Persinger; Campbell Creek (No. 2 Gas) Coal; elevation, 2255' B.; observation by Reger and Price.

Fallen shut, thickness unknown.

Levi Sparks Farm Mine—No. 669 on Map II.

On hillside east of Persinger Creek, 0.3 mile east of Persinger; Campbell Creek (No. 2 Gas) Coal; elevation, 2290' B.; observation by Price.

Fallen shut, thickness unknown.

C. W. Minich Farm Mine—No. 670 on Map II.

On hillside east of Persinger Creek, 0.3 mile northeast of Persinger; Campbell Creek (No. 2 Gas) Coal; elevation, 2290' B.; observation by Price.

Fallen shut, thickness unknown.

C. W. Minich Farm Mine—No. 671 on Map II.

On hillside east of Persinger Creek, 0.3 mile east of Persinger; **Campbell Creek (No. 2 Gas) Coal**; elevation, 2385' B.; observation by Price.

Fallen shut, thickness unknown.

Campbell Creek (No. 2 Gas Bench) Coal, Beaver District.

In Beaver District the Campbell Creek (No. 2 Gas Bench) Coal outcrops principally in the high range of hills north of the Summersville and Slaven Cabin Road, but dips below drainage farther north and passes above the hilltops farther south. The following openings and exposures were noted:

Henry W. Herold Farm Mine—No. 672 on Map II.

On the head of Persinger Creek, 1.4 miles S. 83° E. of Persinger; **Campbell Creek (No. 2 Gas) Coal**; elevation, 2360' B.; observation by Price.

	Ft.	In.
Sandstone, shaly, roof.....		
Coal, thickness concealed.....		

Smoot Lumber Company Prospect—No. 673 on Map II.

On the head of a branch of Crooked Run of Gauley River, 1.4 miles S. 70° E. of Persinger; **Campbell Creek (No. 2 Gas) Coal**; elevation, 2360' B.

Fallen shut, thickness unknown.

George Matheny Farm Mine—No. 674 on Map II.

On a branch of Beaver Creek, 0.9 mile S. 42° E. of Calvin; **Campbell Creek (No. 2 Gas) Coal**; elevation, 2370' B.; observation by Reger and Price.

	Ft.	In.
Shale, sandy, dark.....		
Coal, bony cannel.....	0'	6 "
Slate, gray	0	5½
Coal, medium-hard	1	11½
	<hr style="width: 10%; margin: 0 auto;"/>	
Shale, pavement		

Coal Blossom—No. 675 on Map II.

Along ridge road, 1.0 mile S. 83° E. of Calvin; **Campbell Creek (No. 2 Gas) Coal**; elevation, 2350' B.
 Coal blossom, heavy, thickness unknown.

Coal Blossom—No. 676 on Map II.

Campbell Creek (No. 2 Gas Bench) Coal Kentucky District.
Gas) Coal; elevation, 2335' B.
 Coal blossom, heavy, thickness unknown.

Coal Exposure—No. 677 on Map II.

On east side of Cottle Knob, 1.7 miles west of Allingdale; **Campbell Creek (No. 2 Gas) Coal**; elevation, 2344' B.; for stratigraphic position see Camden-on-Gauley Section, page 153.

	Ft.	In.
Coal, visible	0	9

Campbell Creek (No. 2 Gas Bench) Coal, Kentucky District.

In Kentucky District the Campbell Creek (No. 2 Gas Bench) Coal crops only in the high range of hills south of Gauley River between Persinger Ford and Brock's Bridge, being elsewhere above the hilltops. The following openings and exposures were noted:

Wm. R. Groves Farm Mine—No. 678 on Map II.

In high ridge south of Gauley River, 1.0 mile N. 35° W. of Canvas; **Campbell Creek (No. 2 Gas) Coal**; elevation, 2350' B.

	Ft.	In.
Slate, dark		
Coal, medium-soft	1'	0"
Coal, hard	0	4
Shale, sandy	1	5
Coal	0	6
Slate, reported	1	0
Coal, bony, reported.....	2	0
	6	3

Frank Lewis Farm Mine—No. 679 on Map II.

In high ridge south of Gauley River, 1.0 mile north of Canvas; **Campbell Creek (No. 2 Gas) Coal**; elevation; 2365' B.
 Fallen shut, thickness unknown.

Coal Blossom—No. 680 on Map II.

On hillside south of Gauley River, 1.7 miles N. 13° E. of Canvas; **Campbell Creek (No. 2 Gas) Coal**; elevation, 2385' B.; for stratigraphic position see Persinger Ford (South) Section, page 164.

Coal blossom, thickness unknown.

Quantity of Campbell Creek (No. 2 Gas Bench) Coal Available.

The following table, compiled by Tucker from a close estimate of the acreage, as outlined and limited on Figure 16, shows the probable amount of Campbell Creek (No. 2 Gas Bench) Coal in the County:

Probable Amount of Campbell Creek (No. 2 Gas) Coal.

District	Thickness of Coal Assumed Feet	Square Miles	Acres	Cubic Feet of Coal	Short Tons of Coal
Jefferson	2.5	53.60	34,304	3,735,705,600	149,428,224
Grant	2.5	15.50	9,920	1,080,288,000	43,211,520
Summersville	2.5	22.80	14,592	1,589,068,800	63,562,752
Hamilton	2.0	73.70	47,168	4,109,276,160	164,371,046
Beaver	1.5	20.75	13,280	867,715,200	34,708,608
Kentucky.....	1.5	0.30	192	12,545,280	501,811
Totals.....	.....	186.65	119,456	11,394,599,040	455,783,961

EAGLE COAL.

The Eagle Coal, previously discussed in Chapter VI. page 279, outcrops generally throughout the western and north central portion of the county, being mainly under drainage along the extreme northern line and also near the heads of many of the major streams. South of Gauley River it is found only in a few high, isolated ridges southeast of Summersville, its horizon elsewhere being above the hilltops. As a rule it is double-bedded, being featured by a dark slate or bony parting, coming about one foot from the top. It varies from 2 to 5 feet in thickness, being usually soft and gaseous,

Eagle Coal, Jefferson District.

In Jefferson District the Eagle Coal outcrops in certain localities on Twentymile Creek and its tributaries, on Little Elk Creek, also in the high ridges north of Gauley River, and on Peters Creek and its tributaries, the following openings and exposures having been noted:

Greenbrier Coal Company Prospect—No. 699 on Map II.

On east side of Bells Creek, 0.7 mile north of Belva; **Eagle Coal**; elevation, 765' B.

	Ft.	In.
Shale, sandy		
Coal	1	0
Sandstone, shaly	2	0
Slate, dark	1	6
Coal .....	.0'	2"
Slate, bony .....	.0	6
Coal, soft .....	.2	7
	<hr/>	
Slate, pavement		

Hill Heirs Farm Mine—No. 700 on Map II.

On east side of Bells Creek, 0.9 mile north of Belva; **Eagle Coal**; elevation, 755' B.

	Ft.	In.
Sandstone, Eagle	2	0
Shale, dark, Newlon	2	0
Coal, slaty .....	.0'	5"
Shale, gray .....	.1	10
Coal .....	.0	2
Slate .....	.0	2
Coal, soft .....	.2	7
	<hr/>	
Slate, pavement		

Green Smith Farm Mine—No. 701 on Map II.

Falls District, Fayette County, on south side of Bells Creek, 0.3 mile southwest of Dixie; **Eagle Coal**; elevation, 745' B.

	Ft.	In.
Shale, sandy .....	.10'	0"
Shale, ferruginous	2	0
Coal, soft .....	.1'	8"
Slate, bony .....	.0	3
Coal, soft .....	.1	0
	<hr/>	
Sandstone	3	0

The following is a small mine recently opened for commercial shipment:

**Greenbrier Coal Company, Greenbrier Mine—
No. 702 on Map II.**

On north side of Twentymile Creek, 0.7 mile northeast of Belva;
Eagle Coal; elevation, 800' B.

Section at mine entry:

	Ft.	In.
Sandstone, shaly		
Coal, slaty	0'	1"
Shale, dark	0	7
Coal, medium-soft, columnar.....	2	3
	2	11
Slate, pavement.....		

A section in No. 1 air-course shows the following:

	Ft.	In.
1. Sandstone, massive, Eagle		
2. Draw slate	0	6
3. Coal , soft	2	4
4. Sandstone, pavement		

"Principal office, Fort Defiance, W. Va.; 5 miners and 3 laborers employed; daily output, 35 tons; mule haulage; greatest rise, southeast; Roan Cottrell, Superintendent, authority for mine data; sample (No. 305R) collected from No. 3 of section, the composition of which is published under **Mine No. 702** in the Survey Table of Coal Analyses at the end of this Chapter."

D. H. Copeland Farm Mine—No. 703 on Map II.

On east side of Twentymile Creek, 2.3 miles N. 51° E. of Belva;
Eagle Coal; elevation, 770' B.

	Ft.	In.
Sandstone		
Shale, sandy, Newlon	4	0
Coal	0'	3"
Slate, black.....	0	1
Coal, medium-soft	2	2
	2	6
Slate, pavement		

D. H. Copeland Farm Mine—No. 704 on Map II.

On east side of Twentymile Creek, 2.4 miles N. 49° E. of Belva;
Eagle Coal; elevation, 760' B.

	Ft.	In.
Sandstone, massive, Eagle		

		Ft.	In.
Shale, sandy, Newlon		7	0
Coal	0' 3"		
Slate, black.....	0 1		
Coal, medium-soft	2 3	2	7
Slate, pavement			

The following small mine has recently been opened for commercial shipment:

N. D. Backus Mine—No. 705 on Map II.

On east side of Twentymile Creek, 1 mile south of Vaughan; **Eagle Coal**; elevation, 785' B.

		Ft.	In.
1. Slate			
2. Coal, bony splint.....	0' 3"		
3. Coal, soft	2 1	2	4
4. Slate, pavement			

"Principal office, Vaughan, W. Va.; daily capacity, 40 tons; 7 miners and 4 laborers employed; mule haulage; coal goes to Ohio for steam fuel; greatest rise, southeast; N. D. Backus, owner, authority for mine data; sample (No. 306R) collected from main entry, for the composition of which see **Mine No. 705** in the Survey Table of Coal Analyses at the end of this Chapter."

Livengood Heirs Prospect—No. 706 on Map II.

In ravine north of Gauley River, 1.3 miles S. 75° W. of Swiss; **Eagle Coal**; elevation, 915' B.

		Ft.	In.
Shale, sandy			
Coal, (partly concealed), reported, clean coal.....		2	6

Livengood Heirs Exposure—No. 707 on Map II.

On hillside north of Gauley River, 1.1 miles west of Swiss; **Eagle Coal**; elevation, 910' B.

		Ft.	In.
Sandstone, massive, cliff, ferruginous at base, Eagle ..	18		0
Coal, soft	2		5
Fire clay and sandy shale to Lower Gilbert Sandstone ..	45		0

Coal Prospect—No. 708 on Map II.

On hillside north of Gauley River, 0.55 mile N. 65° W. of Swiss; **Eagle Coal**; elevation, 945' B.; for stratigraphic position see Swiss Section, page 115.

Lackawanna Coal & Lumber Company Prospect—
No. 709 on Map II.

In ravine north of Gauley River, 0.5 mile N. 66° W. of Swiss;
Eagle Coal; elevation, 945' B.

	Ft.	In.
Shale, gray, sandy		
Coal, soft	1'	0"
Slate, dark	0	1
Coal, soft	0	4
Coal, hard? (under water).....	0	10
	<hr/>	2 3

Lackawanna Coal & Lumber Company Farm Mine—
No. 710 on Map II.

On south side of Little Elk Creek, 1.2 miles N. 56° E. of Swiss;
Eagle Coal; elevation, 1000' B.

	Ft.	In.
Sandstone, massive, Eagle.....	15	0
Shale, gray, sandy, Newlon.....	2	0
Coal, soft, columnar.....	2	5
Slate, pavement		

Lackawanna Coal & Lumber Company Farm Mine—
No. 711 on Map II.

On south side of Little Elk Creek, 2.5 miles N. 48° E. of Swiss;
Eagle Coal; elevation, 1775' B.

	Ft.	In.
Sandstone, shaly, Eagle.....	5	0
Coal, soft	1'	3"
Slate, bony	0	1
Coal, soft	0	10
	<hr/>	2 8
Slate, pavement		

Coal Exposure—No. 712 on Map II.

On south side of Little Elk Creek, 2.9 miles N. 40° E. of Swiss;
Eagle Coal; elevation, 1280' B.

	Ft.	In.
Slate		
Coal, soft	1'	3"
Shale, gray	1	0
Coal, medium-soft	1	5
	<hr/>	3 8
Fire clay shale and concealed.....	5	0
Sandstone, massive		

Coal Blossom—No. 713 on Map II.

On south side of Little Elk Creek, 3.0 miles N. 40° E. of Swiss;
Eagle Coal; elevation, 1290' B.

Coal blossom, thickness unknown.

Coal Blossom—No. 714 on Map II.

On south side of Little Elk Creek, 3.1 miles N. 41° E. of Swiss;
Eagle Coal; elevation, 1310' B.

Coal blossom, thickness unknown.

Coal Blossom—No. 715 on Map II.

On south side of Little Elk Creek, 3.2 miles N. 41° E. of Swiss;
Eagle Coal; elevation, 1340' B.

Coal blossom, thickness unknown.

Coal Blossom—No. 716 on Map II.

On south side of Little Elk Creek, 3.4 miles N. 48° E. of Swiss;
Eagle Coal; elevation, 1360' B.

Coal blossom, thickness unknown.

E. V. Shelton Farm Mine—No. 717 on Map II.

In a ravine north of Otter Creek, 0.4 mile N. 25° W. of Lockwood; **Eagle Coal**; elevation, 1275' B.

	Ft.	In.
Sandstone, shaly		
Shale, sandy, Newlon	5	0
Slate, cannel	0	3
Coal , soft	1' 3"	
Slate, bony	0	3
Coal , soft	2 3	3 9
Slate, pavement		

John Summers Farm Mine—No. 718 on Map II.

On south side of Otter Creek, 2.1 miles N. 71° W. of Lockwood;
Eagle Coal; elevation, 1435' B.; for stratigraphic position and details
 see Lockwood Section, page 117.

James Craig Heirs Farm Mine—No. 719 on Map II.

In a ravine east of Line Creek, 1.2 miles N. 22° E. of Lockwood;
Eagle Coal; elevation, 1195' B.

	Ft.	In.
Shale, dark, sandy, Newlon	15	0

		Ft.	In.
Coal, soft	1' 3"		
Slate, bony	0 4		
Coal, semi-splint	1 0		
Coal, soft	1 5	4	0
Shale, gray, pavement			

E. M. Keenan Farm Mine—No. 720 on Map II.

On east side of Line Creek, 1.1 miles N. 20° E. of Lockwood; **Eagle Coal**; elevation, 1190' B.

		Ft.	In.
1. Sandstone, shaly, Eagle	10	0	
2. Shale, dark, Newlon	0	6	
3. Slate, cannel	0	6	
4. Coal, soft	1' 4"		
5. Slate, bony	0 4		
6. Coal, medium-soft	2 5	4	1
7. Slate, pavement			

A sample (No. 298R) was collected from Nos. 4 and 6 of section, the composition of which is published under **Mine No. 720** in the Survey Table of Coal Analyses at the end of this Chapter.

Melvin Grose Farm Mine—No. 721 on Map II.

On east side of Line Creek, 1.3 miles N. of Lockwood; **Eagle Coal**; elevation, 1180' B.

		Ft.	In.
Shale, dark, Newlon	15	0	
Slate, cannel	0	6	
Coal, soft	0' 9"		
Slate, bony	0 4		
Coal, soft	0 5		
Slate, dark	0 2		
Coal, soft	1 6		
Coal, splint	0 4	3	6
Slate, pavement			

Edgar Neal Farm Mine—No. 722 on Map II.

On a branch of Line Creek, 1.3 miles N. 28° W. of Lockwood; **Eagle Coal**; elevation, 1175' B.

		Ft.	In.
Slate, dark, Newlon			
Slate, black, cannel.....	0	5	

	Ft.	In.
Coal, soft	0	10"
Slate, bony	0	4
Coal, soft	0	6
Shale, gray	0	7
Coal, soft	1	10
	4	1
Slate, pavement		

John Grose Heirs Farm Mine—No. 723 on Map II.

On a branch of Line Creek, 1.4 miles N. 28° W. of Lockwood;
Eagle Coal; elevation, 1175' B.

	Ft.	In.
Shale, dark, sandy, Newlon	5	0
Cannel slate		
Coal, soft	1	1"
Slate, bony	0	3
Coal, soft	0	8
Slate, gray	0	8
Coal, estimated.....	1	6
	4	2

John Thomas Farm Mine—No. 724 on Map II.

On west side of Right Fork of Line Creek, 1.3 miles N. 56° E. of
Lockwood; Eagle Coal; elevation, 1230' B.

	Ft.	In.
Sandstone		
Shale, dark, Newlon	5	0
Slate, cannel	0	6
Coal, soft	1	3"
Slate, bony	0	4
Coal, soft	2	3
Shale, gray	0	4
Coal	0	3
Shale, gray	0	8
Coal	0	3
	5	4
Slate, pavement		

C. C. Sharp Farm Mine—No. 725 on Map II.

On west side of Right Fork of Line Creek, 1.4 miles N. 43° E. of
Lockwood; Eagle Coal; elevation, 1235' B.

	Ft.	In.
Shale, sandy, Newlon	10	0
Slate, cannel	0	5
Coal, soft	1	5"
Slate, bony	0	4
Coal, soft	2	3
	4	0
Slate, pavement		

**Lackawanna Coal & Lumber Company Prospect—
No. 726 on Map II.**

On east side of Right Fork of Line Creek, 1.3 miles N. 70° W. of Drennen; **Eagle Coal**; elevation, 1240' B.

	Ft.	In.
Shale, dark		
Coal, soft	1'	5"
Slate, bony	0	6
Coal, soft	2	7
	4	6
Slate, pavement		

**Lackawanna Coal & Lumber Company Prospect—
No. 727 on Map II.**

On east side of Right Fork of Peters Creek, 1.2 miles N. 37° E. of Lockwood; **Eagle Coal**; elevation, 1205' B.

	Ft.	In.
Sandstone, shaly		
Shale, sandy, Newlon	4	0
Slate, cannel	0	6
Coal, soft.....	1'	6"
Slate, bony	0	4
Coal, soft.....	2	6
	4' 4"	mining bench
Slate, dark	0	7
Coal	0	6
Slate, dark	1	0
Coal	0	5½
Slate	0	2½
Coal	4	0
Slate	1	0
Coal, soft	2	2
	10	7
Slate, pavement		

It is possible that the 2' 2" of coal at the bottom of the section may represent the Little Eagle Coal, with a greatly thinned interval between the two seams, as such a section of the Eagle Coal was not observed elsewhere in the county.

C. C. Sharp Farm Mine—No. 728 on Map II.

On east side of Right Fork of Line Creek, 1.9 miles N. 34° E. of Lockwood; **Eagle Coal**; elevation, 1205' B.

	Ft.	In.
Shale, sandy		
Coal, soft	1'	4"
Coal, slaty	0	4
Coal, soft	2	7
	4	3
Slate, pavement		

C. C. Sharp Farm Mine—No. 729 on Map II.

On west side of Right Fork of Line Creek, 1.8 miles N. 43° of Lockwood; **Eagle Coal**; elevation, 1195' B.

	Ft.	In.
Shale, dark, sandy, Newlon	5	0
Slate, cannel	0	5
Coal , soft	1' 5"	
Slate, bony	0	4
Coal , soft	2	3
	<hr/>	
Slate, pavement		

C. C. Sharp Farm Mine—No. 730 on Map II.

On east side of Right Fork of Line Creek, 2.0 miles N. 30° E. of Lockwood; **Eagle Coal**; elevation, 1185' B.

	Ft.	In.
1. Sandstone, shaly, Eagle	10	0
2. Shale, sandy, Newlon	5	0
3. Slate, cannel	0	4
4. Coal , soft	1' 3"	
5. Slate, bony	0	4
6. Coal , soft	2	5
	<hr/>	
7. Slate, pavement, and concealed to creek.....	4	0

A sample (No. 299R) was collected from Nos. 4 and 6 of section, the composition of which is published under **Mine No. 730** in the Survey Table of Coal Analyses at the end of this Chapter.

Delphina Neil Farm Mine—No. 731 on Map II.

On hillside north of Peters Creek, 1.4 miles N. 56° E. of Lockwood; **Eagle Coal**; elevation, 1310' B.

	Ft.	In.
Shale, sandy, Newlon	15	0
Coal , soft	1' 6"	
Slate, bony	0	4
Coal , soft	2	5
	<hr/>	
Slate, pavement		

Flynn Lumber Company Exposure—No. 732 on Map II.

On a short branch of Peters Creek, 2.2 miles S. 81° E. of Lockwood; **Eagle Coal**; elevation, 1535' B.

	Ft.	In.
Fire clay and sandy shale from Powellton Coal	7	6
Coal , mostly concealed, apparently 3' 0" to.....	4	0

Lorenzo Dorsey Prospect—No. 733 on Map II.

On west side of Tate Run of Peters Creek, 0.6 mile N. 83° W. of Drennen; **Eagle Coal**; elevation, 1365' B.
Fallen shut, thickness unknown.

Joseph Dorsey Farm Mine—No. 734 on Map II.

On west side of Tate Run of Peters Creek, 0.6 mile N. 68° W. of Drennen; **Eagle Coal**; elevation, 1390' B.

	Ft.	In.
Shale, dark, Newlon	10	0
Coal , soft	1' 2½"	
Slate, bony	0 4½	
Coal , soft	2 8	4 3
<hr style="width: 20%; margin: 0 auto;"/>		
Shale, gray, pavement		

Joseph Dorsey Farm Mine—No. 735 on Map II.

On west side of Tate Run of Peters Creek, 0.6 mile N. 47° W. of Drennen; **Eagle Coal**; elevation, 1375' B.
Fallen shut, thickness unknown.

Joseph Dorsey Farm Mine—No. 736 on Map II.

On east side of Tate Run of Peters Creek, 1.8 miles N. 29° W. of Drennen; **Eagle Coal**; elevation, 1345' B.

	Ft.	In.
1. Shale, dark, Newlon	10	0
2. Coal , soft	1' 3"	
3. Slate, bony	0 4	
4. Coal , splinty	0 7	
5. Coal , soft	2 0	4 2
<hr style="width: 20%; margin: 0 auto;"/>		
6. Slate, pavement		

A sample (No. 300R) was collected from Nos. 2, 4, and 5 of section, the composition of which is published under **Mine No. 736** in the Survey Table of Coal Analyses at the end of this Chapter.

Austin Drennen Farm Mine—No. 737 on Map II.

On hillside north of Peters Creek, 0.2 mile north of Drennen; **Eagle Coal**; elevation, 1485' B.
Fallen shut, thickness unknown.

Joseph R. Drennen Farm Mine—No. 738 on Map II.

On a short branch of Peters Creek, 0.7 mile N. 27° E. of Drennen; **Eagle Coal**; elevation, 1470' B.

	Ft.	In.
Sandstone, shaly		
Shale, sandy, Newlon	5	0
Coal , soft	1' 2"	
Slate, bony	0	4
Coal , splint	0	9
Coal , soft	1 10	4 1
Slate, pavement		

R. L. Walker Heirs Farm Mine—No. 739 on Map II.

On hillside south of Laurel Creek, 0.5 mile southwest of Tipton; **Eagle Coal**; elevation, 1600' B.

	Ft.	In.
Slate, dark		
Coal , soft	1' 5"	
Slate, bony	0	4
Coal , soft.....	2 5	4 2
Slate, pavement		

Flynn Lumber Company Farm Mine—No. 740 on Map II.

On a branch of Laurel Creek, 0.7 mile S. 37° W. of Tipton; **Eagle Coal**; elevation, 1630' B.

	Ft.	In.
Sandstone, massive, Eagle	10	0
Shale, dark, ferruginous, Newlon	5	0
Coal , soft	1' 5"	
Slate, bony	0	5
Coal , soft	1	8
Slate, dark	0	1
Coal , soft	0 6	4 1
Slate, pavement		

Madison Hypes Farm Mine—No. 741 on Map II.

On hillside east of a south branch of Laurel Creek, 0.8 mile S. 17° E. of Tipton; **Eagle Coal**; elevation, 1700' B.

	Ft.	In.
Shale, dark, Newlon	10	0
Coal , soft	1' 10"	
Slate, bony	0	4
Coal , soft	0	10
Slate, dark	0	2
Coal , soft	2 5	5 7
Slate, pavement		



PLATE XXVII. — Sewell Coal at Granville O'Dell Mine (No. 1235 on Map II), near Hominy Falls; bony parting is visible at base of two-foot rule.

Photo by E. E. Harris.

H. P. Rippetoe Farm Mine—No. 742 on Map II.

On hillside south of Laurel Creek, 1.0 mile S. 17° E. of Tipton;
Eagle Coal; elevation, 1735' B.

	Ft.	In.
Shale, dark		
Coal, soft.....	1'	9"
Slate, bony	0	5
Coal, soft	0	6
Slate, dark	0	2
Coal, soft	2	3
	5	1
Slate, pavement		

Alex. Backus Farm Mine—No. 743 on Map II.

At the head of a branch of Laurel Creek, 1.7 miles S. 19° E. of
Tipton; Eagle Coal; elevation, 1750' B.

	Ft.	In.
1. Shale, dark, Newlon.....	10	0
2. Coal	0'	9"
3. Shale, dark	0	8
4. Coal	0	4
5. Slate, dark	0	7
6. Coal, soft	3	3
	5	7
7. Slate, pavement		

A sample (No. 324R) was collected from No. 6 (mining
ply) of section, the composition of which is published under
Mine No. 743 in the Survey Table of Coal Analyses at the
end of this Chapter.

Gordon Legg Farm Mine—No. 744 on Map II.

At the head of a branch of Gauley River, 1.3 miles S. 15° E. of
Tipton; Eagle Coal; elevation, 1745' B.

	Ft.	In.
Shale, sandy, Newlon.....	15	0
Coal, soft	1'	8"
Slate, dark	0	6
Coal, soft	0	7
Slate, dark	0	1
Coal, soft	2	5
	5	3
Slate, pavement		

Peter Keenan Farm Mine—No. 745 on Map II.

On east side of Panther Mountain, 1.2 miles S. 8° E. of Tipton;

Eagle Coal; elevation, 1685' B.; for stratigraphic position see Panther Mountain Section, page 119.

	Ft.	In.
1. Shale, sandy	10	0
2. Coal, soft .....1' 8"		
3. Slate, dark	0	5
4. Coal, soft	0	11
5. Slate, dark	0	1
6. Coal, soft	0	9
7. Slate, dark	0	5
8. Coal, soft .....2 1	6	4
9. Slate, pavement		

A sample (No. 314R) was collected from Nos. 2, 4, 6, and 8 of section, the composition of which is published under **Mine No. 745** in the Survey Table of Coal Analyses at the end of this Chapter.

Joseph Cavendish Farm Mine—No. 746 on Map II.

On hillside south of Bucklick Branch of Gauley River, 1.6 miles N. 63° W. of Vinton; **Eagle Coal**; elevation, 1515' B.

Fallen shut, thickness unknown.

Samuel Bays Farm Mine—No. 747 on Map II.

On hillside south of Bucklick Branch of Gauley River, 1.4 miles N. 53° W. of Vinton; **Eagle Coal**; elevation, 1525' B.

	Ft.	In.
Fallen shut, coal, reported.....	1	11

Herold and Wiseman Farm Mine—No. 748 on Map II.

On the head of Bucklick Branch of Gauley River, 1.4 miles S. 59° W. of Tipton; **Eagle Coal**; elevation, 1410' B.; fallen shut, reported as follows by Newman Summers:

	Ft.	In.
Coal, clean	5	0

Charles Legg Farm Mine—No. 749 on Map II.

On east hillside of Gauley River, 0.8 mile north of Albion; **Eagle Coal**; elevation, 1640' B.

	Ft.	In.
1. Sandstone, massive, Eagle	10	0
2. Shale, sandy, Newton	5	0
3. Coal, cannel	0' 11½"	
4. Bone	0 1½	

		Ft.	In.
5. Coal, soft	0' 9"		
7. Coal, soft	0 4		
8. Slate, black	0 2		
9. Coal, soft	0 8	3	1
10. Slate, pavement			

A sample (No. 312R) was collected from Nos. 3, 5, 7, and 9 of section, the composition of which is published under **Mine No. 749** in the Survey Table of Coal Analyses at the end of this Chapter.

The following opening was examined by Ray V. Hennen, the data on the same having been previously published on page 622 of the Fayette County Report of the Survey:

J. F. Cavendish Farm Mine—No. 750 on Map II.

On hillside north of Gauley River, 1 mile N. 20° E. of Albion; **Eagle Coal**; elevation, 1685' B.; observation by Ray V. Hennen, the section of the mine, which had fallen shut, being reported by O. W. Mason.

		Ft.	In.
Sandstone, Eagle		64	0
Coal	1' 0"		
Slate	0 2		
Coal	1 10		
Slate	0 2		
Coal, 0' 8" to.....	0 10	4	0
Shale, buff, sandy.....		6	0

Eagle Coal, Grant District.

In Grant District the Eagle Coal outcrops on the waters of Peters Creek and tributaries and in the high ridges north of Meadow Creek, the following openings and exposures having been noted:

Edwin Bell Farm Mine—No. 751 on Map II.

On hillside north of Laurel Creek, 0.5 mile N. 48° E. of Tipton; **Eagle Coal**; elevation, 1655' B.; for stratigraphic position see Tipton Section, page 117.

		Ft.	In.
1. Shale, dark		10	0

		Ft.	In.
2. Coal, soft	1' 4"		
3. Coal, bony	0 4		
4. Coal, soft	2 3		
5. Slate	0 1		
6. Coal	0 4	4	4
7. Slate, pavement			

A sample (No. 323R) was collected from Nos. 2, 4, and 6 of section, the composition of which is published under **Mine No. 751** in the Survey Table of Coal Analyses at the end of this Chapter.

John Acord Farm Mine—No. 752 on Map II.

At the head of a branch of Laurel Creek, 1.2 miles N. 66° E. of Tipton; **Eagle Coal**; elevation, 1660' B.

		Ft.	In.
Shale, dark, Newlon		10	0
Coal, soft	1' 5"		
Slate, bony	0 5		
Coal, soft	2 8	4	6
Slate, pavement			

Samuel Hypes Farm Mine—No. 753 on Map II.

On hillside north of Laurel Creek, 1.3 miles N. 75° E. of Tipton; **Eagle Coal**; elevation, 1705' B.

		Ft.	In.
Slate, black			
Coal, soft	1' 2½"		
Slate, bony	0 3		
Coal, soft	2 4		
Slate, dark	0 0½		
Coal	0 4	4	2
Slate, pavement			

Coal Blossom—No. 754 on Map II.

In road north of Laurel Creek, 1.6 miles east of Tipton; **Eagle Coal**; elevation, 1720' B.

Coal blossom, thickness unknown.

John Brown Coal Blossom—No. 755 on Map II.

On hillside south of Laurel Creek, 1.6 miles N. 75° W. of Keslers Crosslanes; **Eagle Coal**; elevation, 1810' B.

Fallen shut, thickness unknown.

Lackawanna Coal & Lumber Company Prospect—
No. 756 on Map II.

On east side of Jerry Fork of Peters Creek, 2.7 miles S. 84° W. of Gilboa; **Eagle Coal**; elevation, 1390' B.
Fallen shut, thickness unknown.

Lackawanna Coal & Lumber Company Farm Mine—
No. 757 on Map II.

On east side of Jerry Fork of Peters Creek, 2.7 miles S. 85° W. of Gilboa; **Eagle Coal**; elevation, 1385' B.

	Ft.	In.
Sandstone, massive, Eagle		
Slate, dark	2	0
Coal , soft	1' 1"	
Slate, bony	0 4	
Coal , soft	2 2	3 7
<hr style="width: 10%; margin: 0 auto;"/>		
Slate, pavement, and concealed to creek.....	2	0

Elbert Drennen Farm Mine—No. 758 on Map II.

On a tributary of Jones Branch of Peters Creek, 1.4 miles S. 78° W. of Gilboa; **Eagle Coal**; elevation, 1480' B.

	Ft.	In.
Sandstone, Eagle	10	0
Slate, dark	2	0
Coal , soft	1' 0"	
Slate, bony	0 4	
Coal , soft	2 0	3 4
<hr style="width: 10%; margin: 0 auto;"/>		
Slate, pavement		

J. E. Hardway Farm Mine—No. 759 on Map II.

On a tributary of Jones Branch of Peters Creek, 1.9 miles west of Gilboa; **Eagle Coal**; elevation, 1410' B.

	Ft.	In.
1. Sandstone, massive, Eagle	5	0
2. Slate, black	1	6
3. Coal , soft	0' 9"	
4. Slate, bony	0 4	
5. Coal , soft	2 0	3 1
<hr style="width: 10%; margin: 0 auto;"/>		
6. Slate, pavement		

A sample (No. 294R) was collected from Nos. 3 and 5 of section, the composition of which is published under **Mine No. 759** in the Survey Table of Coal Analyses at the end of this Chapter.

W. D. Fitzwater Farm Mine—No. 760 on Map II.

On east side of Jones Branch of Peters Creek, 1.4 miles west of Gilboa; **Eagle Coal**; elevation, 1440' B.

	Ft.	In.
Sandstone, massive, Eagle	15	0
Slate, dark	1	3
Coal, soft	1' 1"	
Slate, bony	0	3
Coal, soft	2	2
	<hr style="width: 50px; margin-left: auto; margin-right: 0;"/>	
Slate, pavement		3 6

M. D. Mason Farm Mine—No. 761 on Map II.

On east side of Jones Branch of Peters Creek, 1.4 miles N. 65° W. of Gilboa; **Eagle Coal**; elevation, 1380' B.

	Ft.	In.
Sandstone, massive, Eagle	15	0
Slate, dark	2	0
Coal, soft	1' 0"	
Slate, bony	0	3
Coal, soft	1	11
Coal, bony splint'	0	3
	<hr style="width: 50px; margin-left: auto; margin-right: 0;"/>	
Fire clay shale, pavement		3 5

Homer Cavendish Farm Mine—No. 762 on Map II.

At the head of a right branch of Peters Creek, 1.5 miles N. 75° E. of Tipton; **Eagle Coal**; elevation, 1710' B.

	Ft.	In.
Sandstone, shaly, Eagle		
Shale, dark, Newlon	4	0
Coal, soft	1' 4"	
Slate, bony	0	2
Coal, soft	2	11
	<hr style="width: 50px; margin-left: auto; margin-right: 0;"/>	
Slate, pavement		4 5

Richard Keenan Farm Mine—No. 763 on Map II.

In ridge west of Rays Branch of Peters Creek, 1.4 miles S. 67° W. of Gilboa; **Eagle Coal**; elevation, 1555' B.

	Ft.	In.
Sandstone massive, Eagle	10	0
Slate, dark	2	0
Coal, soft	1' 1"	
Slate, bony	0	4
Coal, soft	2	3
	<hr style="width: 50px; margin-left: auto; margin-right: 0;"/>	
Shale, gray, pavement.....		3 8

James Gray Farm Mine—No. 764 on Map II.

On east side of Rays Branch of Peters Creek, 0.7 mile S. 64° W. of Gilboa; **Eagle Coal**; elevation, 1530' B. Fallen shut, thickness unknown.

John Hughes Farm Mine—No. 765 on Map II.

At the head of Rays Branch of Peters Creek, 0.7 mile west of Gilboa; **Eagle Coal**; elevation, 1505' B.

	Ft.	In.
1. Sandstone, massive, Eagle	10	0
2. Shale, dark, Newlon	1	6
3. Coal , soft .....1' 0"		
4. Slate, bony .....0 3		
5. Coal , soft .....2 1	3	4
6. Slate, pavement.....		

A sample (No. 293R) was collected from Nos. 3 and 5 of section, the composition of which is published under **Mine No. 765** in the Survey Table of Coal Analyses at the end of this Chapter.

John Legg Farm Mine—No. 766 on Map II.

Near source of Whitewater Branch of Peters Creek, 3.3 miles S. 64° W. of Summersville; **Eagle Coal**; elevation, 1830' B.

	Ft.	In.
Slate, dark		
Coal , slaty .....0' 4"		
Coal , soft .....0 10		
Slate, bony .....0 3		
Coal , soft .....2 9		
Coal , bony .....0 4	4	6
Slate, pavement		

Cortes Stephenson Farm Mine—No. 767 on Map II.

On a short branch of Peters Creek, 0.5 mile N. 65° W. of Gilboa; **Eagle Coal**; elevation, 1525' B.; for stratigraphic position and detail, see Gilboa Section, page 123.

L. D. Shelton Farm Mine—No. 768 on Map II.

On west side of Hutchinson Branch of Peters Creek, 0.5 mile N. 28° W. of Gilboa; **Eagle Coal**; elevation, 1505' B.

	Ft.	In.
Shale, sandy, Newlon	10	0
Slate, black, cannel	0	3
Coal , soft	1' 3"	
Slate, bony	0	3
Coal , soft	2	6
Coal , bony splint	0	3
	<hr/>	
Slate, pavement	4	3

Frank Grose Farm Mine—No. 769 on Map II.

On a tributary of Hutchinson Branch of Peters Creek, 1.0 mile N. 24° W. of Gilboa; **Eagle Coal**; elevation, 1475' B.

	Ft.	In.
Shale, sandy, dark, Newlon	10	0
Slate, black, cannel	0	9
Coal , soft	1' 0"	
Slate, bony	0	4
Coal , soft	2	0
	<hr/>	
Slate, pavement	3	4

John Bayles Farm Mine—No. 770 on Map II.

At the head of Meadow Creek, 1.0 mile N. 10° E. of Sparks; **Eagle Coal**; elevation, 1875' B.

	Ft.	In.
Fallen shut, coal, reported.....	4	0

Eagle Coal, Summersville District.

In Summersville District the Eagle Coal outcrops on the waters of Peters, McKee, and Muddlety Creeks, having been mined extensively for local domestic consumption. The following openings and exposures were noted:

Clark Bell Farm Mine—No. 771 on Map II.

On south side of an east branch of Buckgarden Creek, 1.3 miles N. 57° E. of Gilboa; **Eagle Coal**; elevation, 1620' B.

	Ft.	In.
1. Shale, sandy, Newlon	4	0
2. Coal , soft	0' 5"	
3. Slate, bony	0	6
4. Coal , soft	2	2
	<hr/>	
5. Slate, pavement	3	1

A sample (No. 276R) was collected from No. 4 of section, the composition of which is published under **Mine No. 771** in the Survey Table of Coal Analyses at the end of this Chapter.

John Hypes Farm Mine—No. 772 on Map II.

On west side of Buckgarden Creek, 1.9 miles N. 22° E. of Gilboa; **Eagle Coal**; elevation, 1530' B.

	Ft.	In.
Sandstone, massive, Eagle	5	0
Coal , slaty	1' 2"	
Slate, black, with <i>Naiadites</i> fossils.....	3	2
Coal , soft, partly concealed, about.....	2 0	6 4

It is barely possible that the upper stratum of coal at the above opening should be termed the Eagle "A." Coal, in which case the black slate containing *Naiadites* fossils would be the Newlon Shale, as the occurrence of fossils within the body of a coal seam is most unusual.

Allen Rader Farm Mine--No. 773 on Map II.

On a north branch of Buckgarden Creek, 2.4 miles N. 26° E. of Gilboa; **Eagle Coal**; elevation, 1540' B.

	Ft.	In.
1. Sandstone, massive, Eagle		
2. Shale, sandy	1	0
3. Coal , with cannel slate.....	1' 0"	
4. Coal , soft	2 6	3 6
5. Slate, pavement		

A sample (No. 274R) was collected from No. 4 of section, the composition of which is published under **Mine No. 773** in the Survey Table of Coal Analyses at the end of this Chapter.

John Rader Farm Mine—No. 774 on Map II.

On south side of Buckgarden Creek, 3.0 miles N. 49° E. of Gilboa; **Eagle Coal**; elevation, 1610' B.

	Ft.	In.
Shale, sandy, Newlon	15	0
Slate, black, cannel.....	0	2
Shale, gray	0	7
Coal , soft	0' 10"	
Coal , bony	0 7	
Coal , soft	1 10	3 3
Slate, pavement		

John Rader Farm Mine—No. 775 on Map II.

On south side of Buckgarden Creek, 3.4 miles N. 48° E. of Gilboa; **Eagle Coal**; elevation, 1620' B.

	Ft.	In.
Shale, sandy		
Slate, black, cannel.....	0	6
Shale, gray	0	8
Coal, soft	0'	5"
Coal, bony	0	6
Coal, soft	1	7
<hr/>		
Slate, pavement		

J. B. Carden Farm Mine—No. 776 on Map II.

On hillside west of Rockcamp Branch of Peters Creek, 1 mile southwest of Enon; **Eagle Coal**; elevation, 1695' B.

	Ft.	In.
Shale, sandy	5	0
Coal, slaty	0	10
Slate, dark	5	0
Coal, soft	0'	10"
Slate, bony	0	3
Coal, soft	2	3
Coal, splinty	0	9
<hr/>		
Slate, pavement	4	1

Samuel McClung Farm Mine—No. 777 on Map II.

On hillside east of Rockcamp Branch of Peters Creek, 1 mile southward from Enon; **Eagle Coal**; elevation, 1700' B.

	Ft.	In.
1. Slate, dark		
2. Coal, soft	0'	9½"
3. Slate, bony	0	3
4. Coal, soft	1	11
5. Slate, dark	0	0½
6. Coal, soft	0	6
7. Coal, splint	0	4
<hr/>		
8. Slate, pavement	3	10

A sample (No. 319R) was collected from Nos. 2, 4, 6, and 7 of section, the composition of which is published under Mine No. 777 in the Survey Table of Coal Analyses at the end of this Chapter.

Wm. Stannard Farm Mine—No. 778 on Map II.

On hillside west of Rockcamp Branch of Peters Creek, 1.5 miles southwest of Enon; **Eagle Coal**; elevation, 1700' B.

	Ft.	In.
Slate, dark		
Coal, soft	0'	5"
Slate, black	0	1
Coal, soft	0	8
Coal, bony	0	2
Coal, soft	2	7
Coal, splint	0	2
Coal, soft	0	6
	4	7
Slate, pavement		

Joseph Hicks Farm Mine—No. 779 on Map II.

At head of Rockcamp Branch of Peters Creek, 2.6 miles south of Enon; **Eagle Coal**; elevation, 1820' B.; fallen shut, reported as follows by owner:

	Ft.	In.
Coal, with 1" of slate in middle.....	3	0

Van Stevenson Farm Mine—No. 780 on Map II.

On hillside north of Peters Creek, 0.4 mile N. 79° W. of Enon; **Eagle Coal**; elevation, 1620' B.
Fallen shut, thickness unknown.

R. M. Bryant Farm Mine—No. 781 on Map II.

On east side of McClung Branch of Peters Creek, 1.1 miles southeast of Enon; **Eagle Coal**; elevation, 1720' B.

	Ft.	In.
Shale, sandy	1	0
Coal, cannel bone.....	0'	1"
Coal, soft	0	10
Slate, bony	0	1
Coal, soft	2	3
	3	3
Slate, pavement		

Joseph A. McClung Farm Mine—No. 782 on Map II.

At head of McClung Branch of Peters Creek, 1.5 miles west of Summersville; **Eagle Coal**; elevation, 1825' B.

	Ft.	In.
1. Shale, sandy		
2. Slate, cannel	0	2

		Ft.	In.
3. Coal, soft	0' 11½"		
4. Niggerhead	0 2½		
5. Coal, soft	2 4		
6. Coal, splint	0 4		
7. Coal, soft	0 9	4	7
8. Slate, pavement			

A sample (No. 292R) was collected from Nos. 3, 5, 6, and 7 of section, the composition of which is published under **Mine No. 782** in the Survey Table of Coal Analyses at the end of this Chapter.

Joseph Sebert Farm Mine—No. 783 on Map II.

On south hillside of Peters Creek, 0.3 mile southeast of Enon; **Eagle Coal**; elevation, 1670' B.

	Ft.	In.
Fallen shut, coal, with partings, reported.....	3	8

O. H. Carden Farm Mine—No. 784 on Map II.

On a north branch of Peters Creek, 1.7 miles N. 29° E. of Enon; **Eagle Coal**; elevation, 1640' B.

	Ft.	In.
1. Shale, sandy, Newlon	7	0
2. Slate, cannel	0	2
3. Coal, soft	0' 9"	
4. Coal, bony	0 4	
5. Coal, soft	1 10	2 11
6. Slate, pavement		

A sample (No. 280R) was collected from Nos. 3 and 5 of section, the composition of which is published under **Mine No. 784** in the Survey Table of Coal Analyses at the end of this Chapter.

Moses Neal Farm Mine—No. 785 on Map II.

On a branch of Pine Run of Peters Creek, 1.6 miles N. 49° E. of Enon; **Eagle Coal**; elevation, 1740' B.

	Ft.	In.
1. Sandstone, massive, Eagle		
2. Slate, black	1	0
3. Coal, cannel	0' 3"	
4. Coal, soft	0 8	
5. Slate, bony	0 2	
6. Coal, soft	1 1	2 2
7. Slate, pavement		

A sample (No. 277R) was collected from Nos. 3, 4, and 6 of section, the composition of which is published under **Mine No. 785** in the Survey Table of Coal Analyses at the end of this Chapter.

Benjamin Rader Farm Mine—No. 786 on Map II.

On south side of Pine Run of Peters Creek, 1.5 miles N. 67° E. of Enon; **Eagle Coal**; elevation, 1680' B.

	Ft.	In.
Fallen shut, coal, reported.....	4	0

Coal Blossom—No. 787 on Map II.

In road along Pine Run of Peters Creek, 1.7 miles N. 72° E. of Enon; **Eagle Coal**; elevation, 1700' B.

Coal blossom, thickness unknown.

Andrew Horan Farm Mine—No. 788 on Map II.

On hillside south of Peters Creek 1.1 miles eastward from Enon; **Eagle Coal**; elevation, 1720' B.

	Ft.	In.
Fallen shut, coal, reported.....	4	0

Austin Bryant Farm Mine—No. 789 on Map II.

On north side of Bryant Branch of Peters Creek, 1.8 miles N. 80° E. of Enon; **Eagle Coal**; elevation, 1740' B.

	Ft.	In.
Fallen shut, coal, reported, by owner.....	5	0

Austin Bryant Farm Mine—No. 790 on Map II.

On Bryant Branch of Peters Creek, 2.0 miles N. 83° E. of Enon; **Eagle Coal**; elevation, 1790' B.

	Ft.	In.
1. Slate, dark		
2. Coal, bony cannel .....1' 0"		
3. Coal, medium-soft .....2 7	3	7
4. Slate pavement'		

A sample (No. 278R) was collected from the bony cannel, No. 2 of section, and another (No. 279R) from No. 3, the analyses being published under **Mine No. 790** in the Survey Table of Coal Analyses at the end of this Chapter.

J. F. Thornton Farm Mine—No. 791 on Map II.

On hillside south of Peters Creek, 1.8 miles N. 51° W. of Summersville; **Eagle Coal**; elevation, 1800' B.

	Ft.	In.
Sandstone, massive, Eagle	15	0
Slate, black	0	2
Coal, bony cannel	0' 1"	
Coal, soft	0 11	
Slate, bony	0 2	
Coal, soft	2 7	
Coal, splint	0 3	4 0
<hr style="width: 10%; margin: 0 auto;"/>		
Slate, pavement		

Washington Harlow Farm Mine—No. 792 on Map II.

On hillside north of Peters Creek, 1.1 miles N. 39° W. of Summersville; **Eagle Coal**; elevation, 1860' B.

	Ft.	In.
Sandstone, shaly		
Shale, sandy, Newlon	4	0
Coal, bony cannel.....	0' 2½"	
Coal, soft	0 7½	
Slate, bony	0 3	
Coal, soft	2 6	3 7
<hr style="width: 10%; margin: 0 auto;"/>		
Slate, pavement		

Claude Bell Farm Mine—No. 793 on Map II.

On hillside south of Peters Creek, 1.0 mile N. 55° W. of Summersville; **Eagle Coal**; elevation, 1875' B.

	Ft.	In.
Shale, sandy		
Coal, bony cannel.....	0' 4"	
Coal, soft	0 7	
Slate, bony	0 3	
Coal, soft	2 4	3 6
<hr style="width: 10%; margin: 0 auto;"/>		
Fire clay shale, pavement		

E. L. Alderson Farm Mine—No. 794 on Map II.

On hillside south of Peters Creek, 1.0 mile N. 62° W. of Summersville; **Eagle Coal**; elevation, 1885' B.

	Ft.	In.
Sandstone, massive, Eagle		
Slate, black	0	2
Coal, bony cannel	0' 4"	
Coal, soft	0 8	
Slate, bony	0 4	
Coal, soft	2 4	

		Ft.	In.
Coal, splint	0' 2"	3	10
Slate, pavement			

Joseph Alderson Heirs Farm Mine—No. 795 on Map II.

On hillside south of Peters Creek, 0.8 mile N. 59° W. of Summersville; **Eagle Coal**; elevation, 1910' B.

		Ft.	In.
Sandstone, shaly		2	0
Slate, black		0	3
Coal, cannel	0' 2"		
Coal, soft	0 9		
Slate, bony	0 3-		
Coal, soft	2 6		
Coal, bony splint.....	0 7	4	3
Slate, pavement			

R. K. Harlow Farm Mine—No. 796 on Map II.

On a north branch of Peters Creek, 0.9 mile N. 27° W. of Summersville; **Eagle Coal**; elevation, 1890' B.

		Ft.	In.
Shale, sandy		10	0
Coal		1	2
Shale, sandy, Newlon		7	0
Coal, bony cannel.....	0' 6"		
Coal, soft	0 7		
Slate, bony	0 3		
Coal, soft'	2 5	3	9
Slate, pavement			

John K. Duffy Farm Mine—No. 797 on Map II.

In a ravine north of Peters Creek, 0.4 mile north of Summersville; **Eagle Coal**; elevation, 1955' B.

Fallen shut, thickness unknown.

Joseph Alderson Heirs Farm Mine—No. 798 on Map II.

On the east side of Lonetree Mountain, 0.4 mile west of Summersville; **Eagle Coal**; elevation, 1965' B.; for stratigraphic position and details see Summersville Section, page 127.

Lemon J. Groves Farm Mine—No. 799 on Map II.

On the east side of Lonetree Mountain, 0.4 mile west of Summers-

ville; **Eagle Coal**; elevation, 1960' B.

	Ft.	In.
1. Sandstone, massive, Eagle		
2. Coal, soft	0'	10"
3. Slate, bony	0	3
4. Coal, soft	2	2
5. Coal, bony splint.....	0	6
	<hr style="width: 100px; margin-left: auto; margin-right: 0;"/>	3 9
6. Slate, pavement		

A sample (No. 291R) was collected from Nos. 2, 4, and 5 of section, the composition of which is published under **Mine No. 799** in the Survey Table of Coal Analyses at the end of this Chapter.

Theodore Dorsey Farm Mine—No. 800 on Map II.

On a branch of McKee Creek, 1.6 miles S. 37° W. of Summersville; **Eagle Coal**; elevation, 2000' B.

	Ft.	In.
1. Sandstone, massive, Eagle		
2. Coal, soft	0'	7"
3. Slate, bony	0	2
4. Coal, soft	2	1
5. Coal, splint	0	8
	<hr style="width: 100px; margin-left: auto; margin-right: 0;"/>	3 6
6. Slate, pavement		

A sample (No. 317R) was collected from Nos. 2, 4, and 5 of section, the composition of which is published under **Mine No. 800** in the Survey Table of Coal Analyses at the end of this Chapter.

Elmer Bayles Farm Mine—No. 801 on Map II.

Near head of McKee Creek, 1.7 miles S. 76° W. of Summersville; **Eagle Coal**; elevation, 1830' B.

	Ft.	In.
Shale, sandy, dark, Newlon	15	0
Coal, soft	1'	5"
Slate, bony	0	2
Coal, soft	2	4
Coal, splint	0	4
Slate, bony	0	1
Coal, soft	0	7
	<hr style="width: 100px; margin-left: auto; margin-right: 0;"/>	4 11
Slate, pavement		

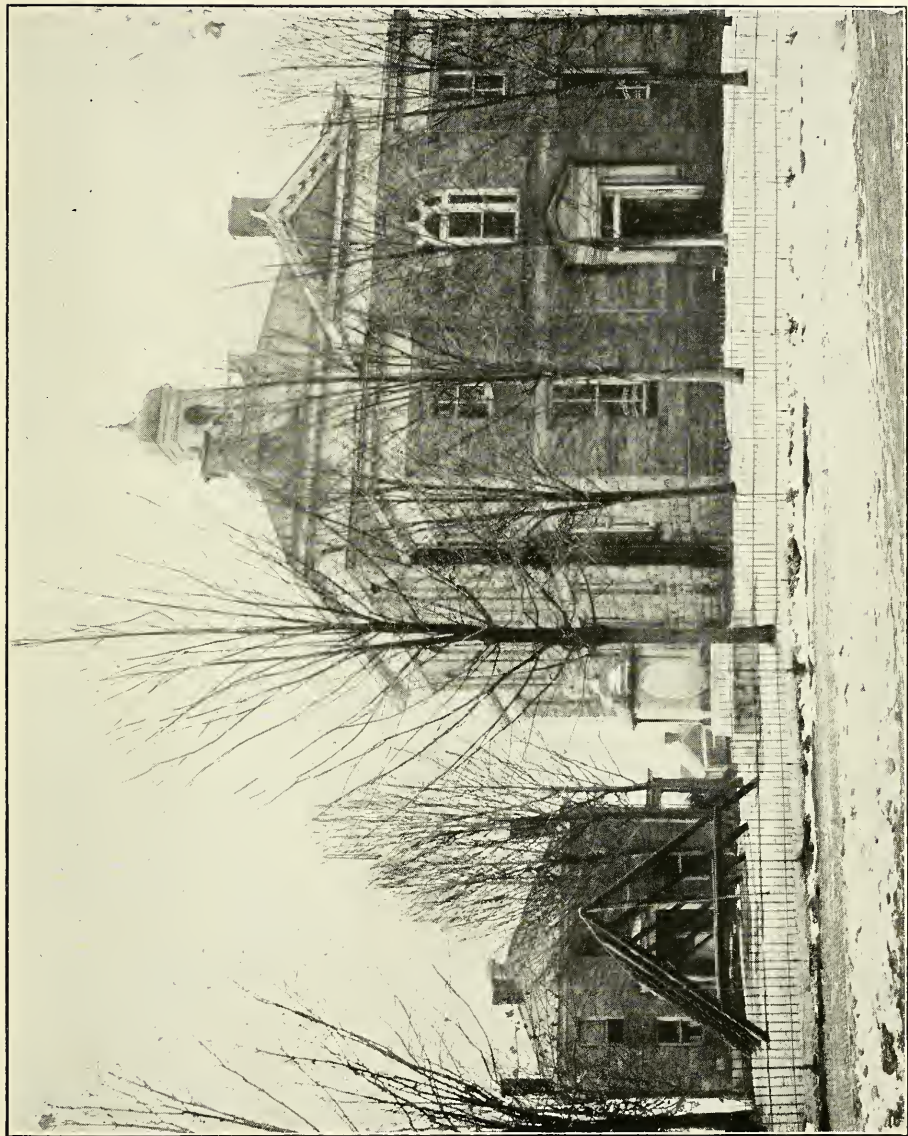


PLATE XXVIII. — Court-House and Jail at Summersville, built of Lower Gilbert Sandstone.
Photo by E. E. Harris.

Henry Gray Farm Mine—No. 802 on Map II.

At the head of McKee Creek, 1.5 miles S. 75° W. of Summersville; **Eagle Coal**; elevation, 1835' B.

	Ft.	In.
Sandstone		
Shale, dark, Newlon	4	0
Slate, bony	0	5
Coal, soft .....	.1'	5"
Shale, bony .....	.0	3
Coal, soft .....	.2	8
Coal, splinty .....	.0 10	5' 2
<hr style="width: 10%; margin-left: auto; margin-right: 0;"/>		
Slate, pavement		

John A. Stowers Farm Mine—No. 803 on Map II.

At the head of a branch of Muddlety Creek, 0.9 mile N. 9° E. of Summersville; **Eagle Coal**; elevation, 1940' B.

	Ft.	In.
Slate, black		
Coal, bony cannel.....	.0'	10"
Coal, medium-soft .....	.1	3
Coal, bony .....	.0	3
Coal, medium-soft .....	.1 3	3 7
<hr style="width: 10%; margin-left: auto; margin-right: 0;"/>		
Slate, pavement		

Jonathan Brown Farm Mine—No. 804 on Map II.

At the head of a branch of Muddlety Creek, 0.9 mile N. 9° E. of Summersville; **Eagle Coal**; elevation, 1945' B.

	Ft.	In.
1. Shale, sandy, Newlon	6	0
2. Coal, cannel bone.....	.0'	7½"
3. Coal, soft .....	.0	5½
4. Coal, bony .....	.0	3
5. Coal, medium-soft .....	.2 3	3 7
<hr style="width: 10%; margin-left: auto; margin-right: 0;"/>		
6. Slate, pavement		

A sample (No. 290R) was collected from Nos. 3 and 5 of section, the composition of which is published under **Mine No. 804** in the Survey Table of Coal Analyses at the end of this Chapter.

Henry Rader Farm Mine—No. 805 on Map II.

On a branch of Glade Creek, 2.7 miles N. 56° E. of Summersville; **Eagle Coal**; elevation, 2100' B.; observation by Price.

	Ft.	In.
Fallen shut, outcrop measurement.....	3	6

Coal Blossom—No. 806 on Map II.

In road west of Muddlety Creek, 1.6 miles N. 21° E. of Summersville; **Eagle Coal**; elevation, 1955' B.; observation by Reger and Price.

	Ft.	In.
Coal blossom, visible	1	0

Coal Blossom—No. 807 on Map II.

In road west of Muddlety Creek, 1.8 miles N. 22° E. of Summersville; **Eagle Coal**; elevation, 1955' B.; observation by Reger and Price.

Coal blossom, thickness unknown.

Richard Peck Farm Mine—No. 808 on Map II.

On south side of Duffy Branch of Muddlety Creek, 1.8 miles N. 9° E. of Summersville; **Eagle Coal**; elevation, 1895' B.; observation by Reger and Price.

	Ft.	In.
Sandstone, massive, Eagle		
Shale, sandy, Newlon	2	0
Coal, bony cannel.....	0' 4"	
Coal, soft	0 4	
Coal, bony	0 5	
Coal, medium-hard	0 7	
Coal, soft, gas	1 5	3 1
<hr style="width: 10%; margin: 0 auto;"/>		
Shale, pavement		

M. C. Duffy Coal Stripping—No. 809 on Map II.

On Duffy Branch of Muddlety Creek, 2.0 miles N. 6° E. of Summersville; **Eagle Coal**; elevation, 1845' B.; observation by Reger and Price.

	Ft.	In.
Fallen shut, coal, reported.....	5	1

H. W. Herold Coal Stripping—No. 810 on Map II.

On west side of Muddlety Creek, 3.2 miles N. 16° E. of Summersville; **Eagle Coal**; elevation, 1840' B.

	Ft.	In.
Fallen shut, coal, reported.....	5	0

Eagle Coal, Hamilton District.

In Hamilton District the Eagle Coal outcrops on the heads of Glade Creek, Phillips Run, and McMillion Creek, all tributary to Muddlety Creek from the east, and on Per-

singer Creek. It has been prospected and mined at numerous points for local domestic use, the following openings and exposures having been noted:

Coal Exposure—No. 811 on Map II.

On the head of Glade Creek, 2.6 miles N. 9° W. of Persinger; **Eagle Coal**; elevation, 2010' B.; observation by Price.

	Ft.	In.
Shale, black, with fossils.....	2	0
Coal, in run, reported.....	2	0

Coal from the above exposure was used for shop purposes by W. P. Milam many years ago.

Coal Exposure—No. 812 on Map II.

On north side of Phillips Run, 0.4 mile S. 77° W. of Kirkwood; **Eagle Coal**; elevation, 1895' B.; observation by Price.

	Ft.	In.
Coal, in run, reported.....	2	0

A. W. Bobbitt Coal Stripping—No. 813 on Map II.

On north side of McMillion Creek, 2.2 miles N. 75° E. of Kirkwood; **Eagle Coal**; elevation, 1935' B.; observation by Price.

	Ft.	In.
Coal stripping, reported.....	2	6

A. W. Bobbitt Farm Mine—No. 814 on Map II.

On a short branch of McMillion Creek, 2.7 miles east of Kirkwood; **Eagle Coal**; elevation, 1985' B.; observation by Price.

	Ft.	In.
Sandstone		
Shale, about	2	0
Shale, bituminous	0	3
Coal, soft	1' 2½"	
Shale	0	0½
Coal, soft	0	8
		<hr/>
	1	11
Shale, ferruginous		

Farm Mine—No. 815 on Map II.

In road, north side of McMillion Creek, 2.6 miles N. 4° E. of Persinger; **Eagle Coal**; elevation, 1960' B.; observation by Price.

	Ft.	In.
Fallen shut, coal, reported.....	2	0

A. W. Bobbitt Farm Mine—No. 816 on Map II.

On south side of McMillion Creek, 2.3 miles N. 6° E. of Persinger; **Eagle Coal**; elevation, 1970' B.; observation by Price.

	Ft.	In.
Sandstone		
Shale, fissile		
Coal, dirty and bony.....	0'	5½"
Bone	0	1
Coal with three paper-thin shales.....	1	9½
	<hr/>	2 4
Shale, pavement		

J. H. Baker Farm Mine—No. 817 on Map II.

On north side of McMillion Creek, 2.3 miles N. 11° E. of Persinger; **Eagle Coal**; elevation, 2013' L.; observation by Price.
Fallen shut, thickness unknown.

J. H. Baker Farm Mine—No. 818 on Map II.

On south side of McMillion Creek, 2.1 miles N. 12° E. of Persinger; **Eagle Coal**; elevation, 1983' L.; observation by Price.

	Ft.	In.
Sandstone .....	.25	0
Shale, plantal	4	0
Coal, bony	0'	4½"
Shale, soft	0	1½
Coal	1	7
	<hr/>	2 1
Shale, light to black, plant fragments.....	18	0

David Brown Farm Mine—No. 819 on Map II.

On west side of McMillion Creek, 2.0 miles N. 18° E. of Persinger; **Eagle Coal**; elevation, 2040' B.; observation by Price.

	Ft.	In.
Sandstone		
Shale	0	2
Coal, soft, bony	0'	4½"
Shale	0	1
Coal, dirty	1	8½
	<hr/>	2 2
Shale, pavement		

A. A. Bibb Exposure—No. 820 on Map II.

On west side of McMillion Creek, 1.9 miles N. 19° E. of Persinger; **Eagle Coal**; elevation, 2045' B.; observation by Price.

	Ft.	In.
Sandstone		
Shale	0	8
Coal	0	6½
Shale		

A. A. Bibb Farm Mine—No. 821 on Map II.

On west side of McMillion Creek, 1.7 miles N. 21° E. of Persinger;
Eagle Coal; elevation, 2090' B.

	Ft.	In.
Coal, 2' 0" to.....	2	6

A. A. Bibb Farm Mine—No. 822 on Map II.

On west side of McMillion Creek, 1.7 miles N. 24° E. of Persinger;
Eagle Coal; elevation, 2065' B.; observation by Price.

	Ft.	In.
1. Sandstone, massive		
2. Shale, sandy, light, Newlon	1	6
3. Coal, dirty	0' 4½"	
4. Shale, soft	0 1½"	
5. Coal, medium-hard	1 8"	2 2
6. Shale, payement		

A sample (No. 14P) was collected from Nos. 3 and 5 of section, the composition of which is published under **Mine No. 822** in the Survey Table of Coal Analyses at the end of this Chapter.

A. A. Bibb Farm Mine—No. 823 on Map II.

On east side of McMillion Creek, 1.8 miles N. 22° E. of Persinger;
Eagle Coal; elevation, 2070' B.; observation by Price.
 Fallen shuf, thickness unknown.

A. A. Bibb Farm Mine—No. 824 on Map II.

On east side of McMillion Creek, 1.9 miles N. 24° E. of Persinger;
Eagle Coal; elevation, 2070' B.; observation by Price.
 Fallen shuf, thickness unknown.

A. A. Bibb Farm Mine—No. 825 on Map II.

On west side of McMillion Creek, 1.4 miles N. 21° E. of Persinger;
Eagle Coal; elevation, 2110' B.; observation by Price.

	Ft.	In.
Sandstone		
Sandy shale and sandstone	4	0
Coal, bony, (estimated).....	0' 8"	
Coal, soft, (estimated).....	1 6"	2 2
Concealed in water.....		

A. A. Bibb Farm Mine—No. 826 on Map II.

On west side of McMillion Creek, 1.4 miles N. 24° E. of Persinger;
Eagle Coal; elevation, 2100' B.; observation by Price.
 Fallen shut, thickness unknown.

Floyd Riffle Farm Mine—No. 826A on Map II.

At head of McMillion Creek, 1.7 miles N. 31° E. of Persinger;
Eagle Coal; elevation, 2135' B.; observation by Reger and Price.

	Ft.	In.
Slate, dark		
Coal, slightly bony.....	0'	10"
Coal, medium-soft	1	10
	<hr style="width: 10%; margin: 0 auto;"/>	
Slate, pavement		

Coal Exposure—No. 826B on Map II.

In road at head of McMillion Creek, 1.7 miles N. 39° E. of Persinger;
Eagle Coal; elevation, 2155' B.; observation by Reger and Price.

	Ft.	In.
Shale, sandy		
Coal, soft	1	10
Slate, shale, and sandstone.....	20	0

Chapman Bros. Coal Blossom—No. 827 on Map II.

On hillside west of Persinger Creek, 0.3 mile west of Persinger;
Eagle Coal; elevation, 2210' B.; observation by Price.

	Ft.	In.
Coal blossom, visible (3' 0" reported).....	1	0

Ira Mays Farm Mine—No. 828 on Map II.

On hillside east of Persinger Creek, 0.3 mile N. 70° E. of Persinger;
Eagle Coal; elevation, 2225' B.; observation by Price.

	Ft.	In.
Sandstone, massive, Eagle		
Shale, gray, thin limestone nodules, Newlon	4	0
Bone	0	5½
Coal, soft	1'	0 "
Shale	0	0½
Coal, soft	0	10
Coal, hard, splint, visible.....	0	3
	<hr style="width: 10%; margin: 0 auto;"/>	
Concealed		

A. D. Grose Farm Mine—No. 829 on Map II.

On a branch of Persinger Creek, 0.8 mile N. 67° E. of Persinger; **Eagle Coal**; elevation, 2255' B.; observation by Reger and Price.

	Ft.	In
Sandstone, massive		
Coal, soft	0'	5"
Bone	0	2
Coal, medium-soft	1	11
	2	6
Slate, pavement		

Ira Mays Farm Mine—No. 830 on Map II.

On hillside west of Persinger Creek, 0.6 mile N. 19° E. of Persinger; **Eagle Coal**; elevation, 2210' B.

Fallen shut, thickness unknown.

Farm Mine—No. 831 on Map II.

On south side of Persinger Creek, 1.1 miles N. 49° E. of Persinger; **Eagle Coal**; elevation, 2110' B.; observation by Price.

	Ft.	In.
Sandstone, shaly		
Coal, soft	0'	2½"
Shale	0	2
Coal, hard	1	9½
	2	2
Shale		

Eagle Coal, Beaver District.

In Beaver District the Eagle Coal outcrops in the hills north of the Summersville and Slaven Cabin Road, but at the northern end of the district its horizon lies under drainage. South of the highway mentioned its position is above the hilltops. The following openings and exposures were noted:

Henry W. Herold Farm Mine—No. 832 on Map II.

On the head of Persinger Creek, 1.4 miles N. 84° E. of Persinger; **Eagle Coal**; elevation, 2290' B.; observation by Price.

Fallen shut, thickness unknown.

Smoot Lumber Company Farm Mine—No. 833 on Map II.

On a northeast branch of Crooked Run of Gauley River, 0.8 mile N. 18° E. of Nile; **Eagle Coal**; elevation, 2310' B.

	Ft.	In.
Shale, sandy, Newlon.....	3	0
Coal, soft	0' 4"	
Slate, bony	0 3	
Coal, soft	1 10	2 5
<hr style="width: 10%; margin-left: 0;"/>		
Slate, pavement		

T. F. Hicks Farm Mine—No. 834 on Map II.

On hill north of Summersville and Slaven Cabin Road, 1.5 miles N. 73° E. of Nile; **Eagle Coal**; elevation, 2335' B.; observation by Reger and Price.

	Ft.	In.
1. Slate, black		
2. Coal, cannel.....	0' 1"	
3. Coal, medium-soft	0 9	
4. Coal, bony	0 6	
5. Coal, medium-soft, columnar.....	2 1	3 5
<hr style="width: 10%; margin-left: 0;"/>		
6. Slate, pavement		

A sample (No. 241R) was collected from Nos. 3 and 5 of section, the composition of which is published under **Mine No. 834** in the Survey Table of Coal Analyses at the end of this Chapter.

Griffith Creasy Farm Mine—No. 835 on Map II.

At the head of a branch of Beaver Creek, 1.5 miles west of Beaver village; **Eagle Coal**; elevation, 2315' B.; observation by Reger and Price.

Fallen shut, thickness unknown.

Coal Blossom—No. 836 on Map II.

In road on west side of Little Beaver Creek, 0.8 mile N. 41° W. of Calvin; **Eagle Coal**; elevation, 2230' B.; observation by Reger and Price.

Coal blossom, thickness unknown.

Q. W. Hanna Farm Mine—No. 837 on Map II.

On a short branch of Beaver Creek, 1.9 miles northward from Beaver village; **Eagle Coal**; elevation, 2220' B.

	Ft.	In.
Shale, dark		
Coal, cannel	0'	1"
Coal, soft	1	6
Slate, bony, 0' 6" to	0	2
Coal, medium-soft	2	0
	<hr/>	
	3	9
Slate, pavement		

Abram Hanna Farm Mine—No. 838 on Map II.

On south side of Hannah Run of Beaver Creek, 2.3 miles north of Beaver; **Eagle Coal**; elevation, 2210' B.; observation by Reger and Price.

	Ft.	In.
1. Slate, black		
2. Coal, medium-soft	0'	7½"
3. Coal, bony	0	1
4. Coal, soft	1	0
5. Slate, black	1	5
6. Coal, medium-soft	1	9½
	<hr/>	
	4	11
7. Slate, pavement		

A sample (No. 249R) was collected from Nos. 2, 3, 4, and 6 of section, the composition of which is published under **Mine No. 838** in the Survey Table of Coal Analyses at the end of this Chapter.

Craig Coal Stripping—No. 839 on Map II.

On Cherry Run of Rockcamp Run of Gauley River, 1 mile north of Craigsville; **Eagle Coal**; elevation, 2275' B.

	Ft.	In.
Shale, black, Newlon	2	0
Coal, soft	0'	7¾"
Smut band	0	0¼
Coal, soft	0	6
	<hr/>	
	1	2
Fire clay shale		

It is possible that another bench of coal was concealed below the fire clay shale, as the stripping was reported by Luther Callaghan as being 4' 0" thick with a heavy parting.

John Woods Farm Mine—No. 840 on Map II.

Just east of Cottle Knob, 1.5 miles S. 84° W. of Allingdale; **Eagle Coal**; elevation, 2255' B.

	Ft.	In.
1. Shale, dark, Newlon	2	0
2. Slate, cannel	0	6
3. Coal , soft	1' 3"	
4. Slate, bony	0	6
5. Coal , hard	0	4
6. Coal , soft	1	5
	3	6
7. Slate, pavement		

A sample (No. 337R) was collected from Nos. 3, 5, and 6 of section, the composition of which is published under **Mine No. 840** in the Survey Table of Coal Analyses at the end of this Chapter. Coal from the above opening is used extensively for local trade being hauled by wagon to Camden-on-Gauley and the surrounding community.

Eagle Coal, Kentucky District.

In Kentucky District the Eagle Coal outcrops only in the high ridge south of Gauley River between Persinger Ford and Brocks Bridge, being elsewhere above the hilltops. It has been prospected but little in this vicinity, the following opening and exposure having been noted:

M. R. Rader Prospect—No. 841 on Map II.

At the head of a branch of Rader Run of Gauley River, 0.8 mile west of Canvas; **Eagle Coal**; elevation, 2265' B.

	Ft.	In.
Fallen shut, coal , reported.....	1	9

According to report no roof had yet been found when the above entry was abandoned on account of the dip, and it may be possible that the full section of the coal would be more than the figures show.

Coal Blossom—No. 842 on Map II.

On hill south of Gauley River, 1.0 mile N. 34° W. of Canvas; **Eagle Coal**; elevation, 2280' B.

Coal blossom, thickness unknown.

Quantity of Eagle Coal Available.

The following table, compiled by Tucker from a planimetric measurement of the outcrop on Map II, as limited by Figure 17, shows the probable amount of Eagle Coal in the County:

Probable Amount of Eagle Coal.

District	Thickness of Coal Assumed Feet.	Square Miles	Acres	Cubic Feet of Coal	Short Tons of Coal
Jefferson	3.0	57.60	36,864	4,817,387,520	192,695,501
Grant	3.0	23.60	15,104	1,973,790,720	78,951,629
Summersville	3.0	38.45	24,608	3,215,773,440	128,630,937
Hamilton	2.5	106.70	68,288	7,436,563,200	297,462,528
Beaver	2.5	23.90	15,296	1,665,734,400	66,629,376
Kentucky	2.0	0.75	480	41,817,600	1,672,704
Totals .....	.....	251.00	160,640	19,151,066,880	766,042,675

LITTLE EAGLE COAL.

The Little Eagle Coal, previously discussed in Chapter VI, page 280, outcrops generally throughout a belt several miles wide, extending from Belva, at the extreme western end of the county, eastward to Camden-on-Gauley. In the northern end of the county its horizon lies under drainage and south of the Gauley River it is found only in a few high, isolated ridges southeast of Summersville, being elsewhere above the hilltops. As a rule it is soft, gaseous and single-bedded, varying in thickness from 1 to 2½ feet. In quality it is a very pure coal, being high in volatile matter, and exceedingly low in sulphur, ash, and phosphorus. Owing to its thin section it could scarcely be mined at the present time in competition with the thicker coals but when these have approached exhaustion it will furnish a considerable amount of minable coal in the western end of the county where

it is best developed. Its outcrop is not shown on Map II, but its position at any point may be determined from the Eagle seam which comes above it by an interval of 30 to 50 feet. Figure 18 shows its probable minable extent.

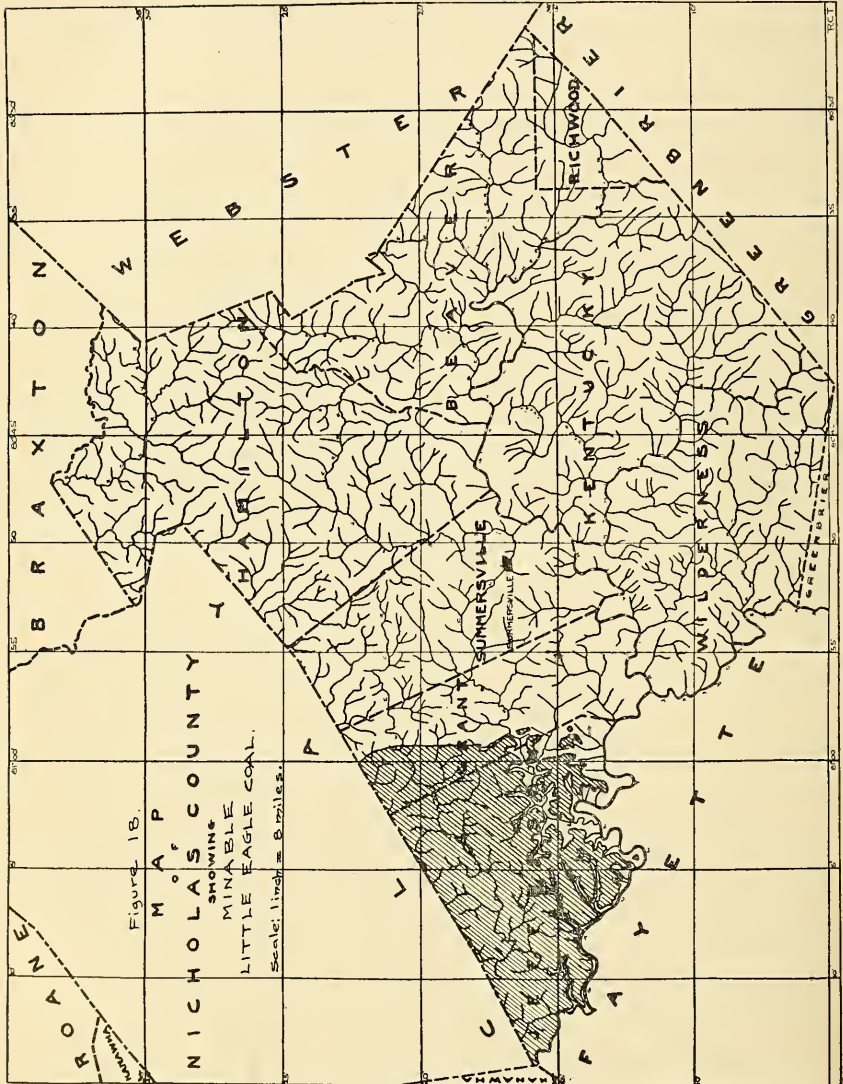


Figure 18

Little Eagle Coal, Jefferson District.

In Jefferson District the Little Eagle Coal outcrops on the lower waters of Twentymile Creek, on the Gauley River frontage, and on Little Elk Creek and the waters of Peters Creek. It has been prospected and mined to a limited extent for local domestic fuel at various points, the following openings and exposures having been noted:

Coal Blossom—No. 843 on Map II.

On north side of Bells Creek, 0.7 mile N. 35° E. of Belva; **Little Eagle Coal**; elevation, 765' B.

Coal blossom, thickness unknown.

Coal Prospect—No. 844 on Map II.

On north bank of Twentymile Creek, 1.4 miles N. 48° E. of Belva; **Little Eagle Coal**; elevation, 745' B.

	Ft.	In.
Coal prospect, thickness unknown.....		
Sandstone, massive, cliff, to creek.....	30	0

Coal Exposure—No. 845 on Map II.

On north side of Twentymile Creek, 3.8 miles S. 63° W. of Harriet; **Little Eagle Coal**; elevation, 1020' B.

	Ft.	In.
Sandstone, massive, Decota	40	0
Shale, gray	3	0
Coal	2	0
Shale	5	0

Coal Prospect—No. 846 on Map II.

On north side of Hardway Branch of Twentymile Creek, 4.1 miles S. 55° W. of Harriet; **Little Eagle Coal**; elevation, 1000' B.

	Ft.	In.
Sandstone, massive, Decota	10	0
Shale, gray	2	0
Coal, soft, visible, (reported 2' 0").....	1	6

Coal Prospect—No. 847 on Map II.

On hillside north of Gauley River, 0.5 mile west of Swiss; **Little Eagle Coal**; elevation, 915' B.; for stratigraphic position see Swiss Section, page 115.

Fallen shut, thickness unknown.

**Lackawanna Coal & Lumber Company Prospect—
No. 848 on Map II.**

In ravine north of Gauley River, 0.5 mile N. 51° W. of Swiss;
Little Eagle Coal; elevation, 895' B.

	Ft.	In.
Sandstone, massive, Decota	20	0
Shale, gray	0	2
Coal, soft	0	3"
Coal, splinty	0	10
Coal, soft	1	5
<hr style="width: 50%; margin-left: auto; margin-right: 0;"/>		
Slate, pavement	2	6

Miletus Simms Farm Mine—No. 849 on Map II.

On hill north of Gauley River, 0.1 mile north of Swiss; **Little Eagle Coal**; elevation, 925' B.

	Ft.	In.
1. Sandstone, massive, Decota	10	0
2. Coal, soft	0	3 "
3. Coal, splinty	0	6
4. Coal, soft	0	9
5. Slate, bony	0	0½
6. Coal, soft	0	8½
<hr style="width: 50%; margin-left: auto; margin-right: 0;"/>		
7. Slate, pavement	2	3

A sample (No. 303R) was collected from Nos. 2, 3, 4, and 6 of section, the composition of which is published under **Mine No. 849** in the Survey Table of Coal Analyses at the end of this Chapter.

Coal Prospect—No. 850 on Map II.

On south side of Little Elk Creek, 1.1 miles N. 43° E. of Swiss;
Little Eagle Coal; elevation, 945' B.
Fallen shut, thickness unknown.

Coal Blossom—No. 351 on Map II.

On Coal Hollow of Little Elk Creek, 1.4 miles N. 30° E. of Swiss;
Little Eagle Coal; elevation, 930' B.

	Ft.	In.
Coal blossom and black slate.....		
Sandstone, massive	20	0

**Lackawanna Coal & Lumber Company Prospect—
No. 852 on Map II.**

On south side of Little Elk Creek, 2.5 miles N. 43° E. of Swiss;
Little Eagle Coal; elevation, 1130' B.

	Ft.	In.
Sandstone, shaly, Decota	10	0
Coal, soft	1	11

**Lackawanna Coal & Lumber Company Prospect—
No. 853 on Map II.**

On north side of Little Elk Creek, 2.5 miles N. 40° E. of Swiss;
Little Eagle Coal; elevation, 1145' B.
Fallen shut, thickness unknown.

Coal Exposure—No. 854 on Map II.

On south side of Little Elk Creek, 2.7 miles N. 42° E. of Swiss;
Little Eagle Coal; elevation, 1160' B.

	Ft.	In.
Sandstone, shaly		
Coal, thickness concealed.....		
Concealed and sandstone to creek.....	5	0

Coal Exposure—No. 855 on Map II.

On north side of Otter Creek, 1.5 miles N. 73° W. of Lockwood;
Little Eagle Coal; elevation, 1190' B.

	Ft.	In.
Sandstone		
Shale, sandy, with ferruginous nodules.....	5	0
Coal, slaty	0	6
Fire clay shale.....		

John Summers Farm Mine—No. 856 on Map II.

On hillside south of Otter Creek, 2.0 miles N. 70° W. of Lockwood; **Little Eagle Coal**; elevation, 1375' B.; for stratigraphic position and details see Lockwood Section, page 117.

Delphina Neil Farm Mine—No. 857 on Map II.

On hillside north of Peters Creek, 1.4 miles S. 80° W. of Drennen;
Little Eagle Coal; elevation, 1245' B.

	Ft.	In.
Fallen shut, coal, reported.....	2	6

Lorenzo Dorsey Farm Mine—No. 858 on Map II.

On west side of Tate Run of Peters Creek, 0.6 mile west of Drennen; **Little Eagle Coal**; elevation, 1310' B.

	Ft.	In.
1. Shale, dark	5	0
2. Coal , soft	2	4
3. Slate, pavement		

A sample (No. 301R) was collected from No. 2 of section, the composition of which is published under **Mine No. 858** in the Survey Table of Coal Analyses at the end of this Chapter.

Joseph Dorsey Farm Mine—No. 859 on Map II.

On west side of Tate Run of Peters Creek, 0.6 mile northwest of Drennen; **Little Eagle Coal**; elevation, 1310' B.

	Ft.	In.
Sandstone, massive		
Coal , soft, visible (reported 2' 6" clean coal).....	1	0

Coal Blossom—No. 860 on Map II.

On west hillside of Tate Run of Peters Creek, 0.5 mile N. 43° W. of Drennen; **Little Eagle Coal**; elevation, 1330' B.

Coal blossom, thickness unknown.

Herold & Wiseman Farm Mine—No. 861 on Map II.

At head of Bucklick Branch of Gauley River, 1.5 miles S. 52° W. of Tipton; **Little Eagle Coal**; elevation, 1330' B.

	Ft.	In.
Sandstone, massive, Decota		
Shale, dark	10	0
Coal , soft	0	9"
Slate, dark	0	1
Coal	0	7
	1	5
Slate, pavement		

Charles Legg Farm Mine—No. 862 on Map II.

On a short branch of Gauley River, 0.8 mile northward from Albion; **Little Eagle Coal**; elevation, 1580' B.

	Ft.	In.
Fallen shut, coal, reported.....	1	10

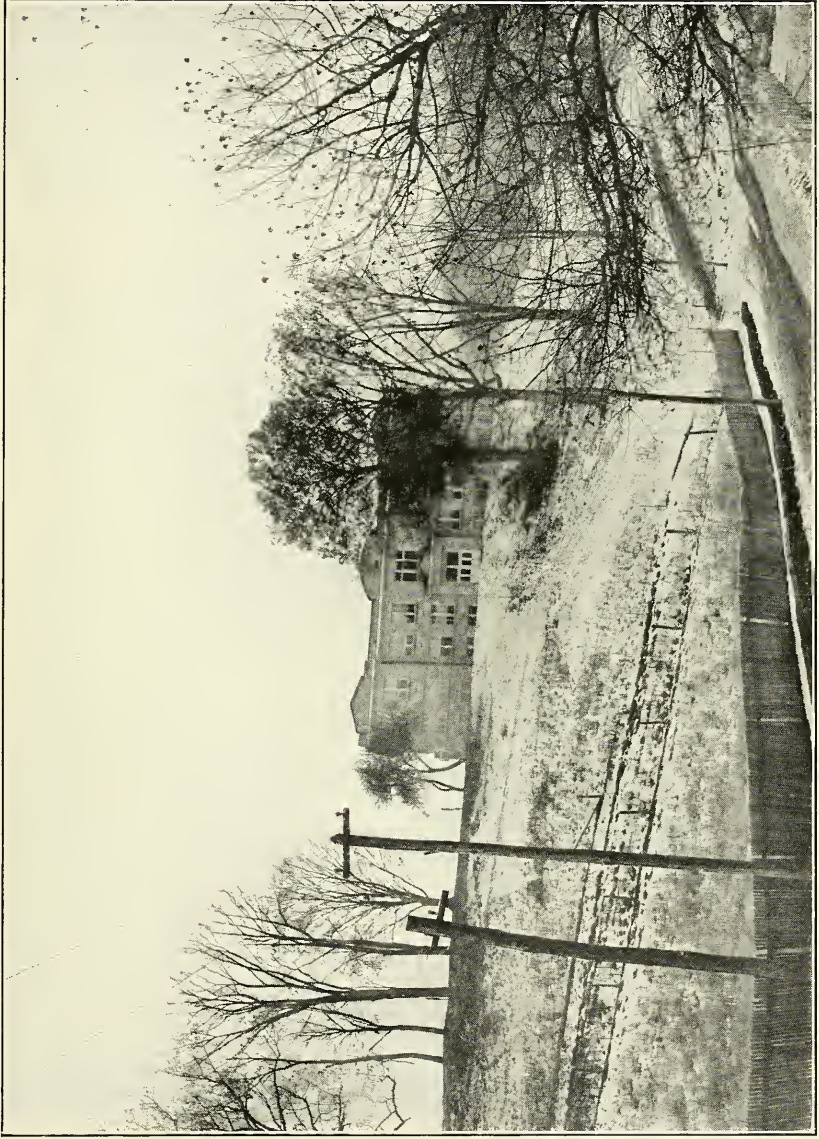


PLATE XXIX. — Nicholas County High School at Summersville, built of Monitor, Lower Gilbert, and Dotson Sandstones.

Photo by E. E. Harris,

Little Eagle Coal, Grant District.

In Grant District the Little Eagle Coal outcrops on the waters of Peters Creek, and also in the high hills southward toward the Gauley River but does not appear to have minable thickness, except along the western edge. The following exposures were noted:

Coal Exposure—No. 863 on Map II.

On hillside north of Peters Creek, 1.5 miles S. 52° W. of Gilboa; **Little Eagle Coal**; elevation, 1425' B.

	Ft.	In.
Sandstone		
Shale, dark, sandy	10	0
Coal	0	6
Fire clay shale		

Coal Blossom—No. 864 on Map II.

On a short branch of Peters Creek, 0.5 mile northwest of Gilboa; **Little Eagle Coal**; elevation, 1460' B.; for stratigraphic position see Gilboa Section, page 123.

Coal blossom, thickness unknown.

Little Eagle Coal, Summersville District.

In Summersville District the Little Eagle Coal outcrops principally on the waters of Peters, McKee, and Muddlety Creeks, as well as on certain short branches of Gauley River, but does not appear to have minable thickness in any of these localities. The following openings and exposures were noted:

Coal Prospect—No. 865 on Map II.

On east side of Buckgarden Creek, 1.7 miles N. 31° E. of Gilboa; **Little Eagle Coal**; elevation, 1500' B.

Fallen shut, thickness unknown.

Coal Exposure—No. 866 on Map II.

On south side of McClung Branch of Peters Creek, 2.7 miles N. 72° W. of Summersville; **Little Eagle Coal**; elevation, 1680' B.

Coal blossom, thickness unknown.

Coal Exposure—No. 867 on Map II.

On north side of Peters Creek, 1.1 miles northwest of Summersville; **Little Eagle Coal**; elevation, 1820' B.

	Ft.	In.
Coal, about	1	0

Coal Exposure—No. 868 on Map II.

On a short branch of Peters Creek, 0.9 mile N. 31° W. of Summersville; **Little Eagle Coal**; elevation, 1835' B.

	Ft.	In.
Shale, sandy		
Coal	0	10
Fire clay shale.....		

Coal Exposure—No. 869 on Map II.

In road on hill east of McKee Creek, 1.9 miles S. 39° W. of Summersville; **Little Eagle Coal**; elevation, 1935' B.

	Ft.	In.
Coal	0	6

Coal Blossom—No. 870 on Map II.

On a west branch of Muddlety Creek, 1.0 mile N. 15° E. of Summersville; **Little Eagle Coal**; elevation, 1900' B.
Coal blossom, thickness unknown.

Coal Exposure—No. 871 on Map II.

In road, south side of Duffy Branch of Muddlety Creek, 0.2 mile N. 16° E. of Summersville; **Little Eagle Coal**; elevation, 1860' B.; observation by Reger and Price.

	Ft.	In.
Sandstone, heavy, Decota		
Coal, thickness concealed		

Little Eagle Coal, Hamilton District.

In Hamilton District the Little Eagle Coal outcrops near the head of Anthony and McMillion Creeks, on Persinger Creek, and in the high ridges north of the Gauley River, but does not appear to have minable thickness. The following openings and exposures were noted:

Coal Exposure—No. 872 on Map II.

On east side of Anthony Creek, 3.1 miles S. 48° E. of Birch River village; **Little Eagle Coal**; elevation, 1325' B.; observation by Reger and Price.

	Ft.	In.
Sandstone, massive, Decota		
Coal	0' 2 "	
Slate	0 0½	
Coal	0 5½	0 8
Shale, dark	0	4
Sandstone, massive		

Coal Blossom—No. 873 on Map II.

On Hamilton-Summersville District Line, on ridge south of Glade Creek, 3.0 miles N. 53° E. of Summersville; **Little Eagle Coal**; elevation, 2060' B.; observation by Price.

Coal, reported, thickness unknown.

Coal Exposure—No. 874 on Map II.

On south side of McMillion Creek, 2.5 miles east of Kirkwood; **Little Eagle Coal**; elevation, 1930' B.; observation by Price.

	Ft.	In.
Soil		
Shale, brown	2	0
Shale, black, fissile	0	4
Shale, dark	7	8
Coal, lens	0	3
Shale, concealed in water.....		

Coal Prospect—No. 875 on Map II.

In road on head of McMillion Creek, 1.6 miles N. 35° E. of Persinger; **Little Eagle Coal**; elevation, 2085' B.; observation by Reger and Price.

Fallen shuf, thickness unknown.

U. C. Laughery Prospect—No. 876 on Map II.

At the head of a short branch of Gauley River, 2.3 miles S. 68° W. of Persinger; **Little Eagle Coal**; elevation, 2135' B.; observation by Price.

	Ft.	In.
Weathered shale and soil.....		
Coal	0	6
Shale	1	0
Concealed	5	0
Shale, black	8	0

Coal Stripping—No. 877 on Map II.

On south side of Persinger Creek, 1.1 miles N. 38° E. of Persinger; **Little Eagle Coal**; elevation, 2090' B.; observation by Price.
Coal, in bottom, thickness concealed.

Little Eagle Coal, Beaver District.

In Beaver District the Little Eagle Coal outcrops on the lower waters of Beaver Creek, on Little Beaver, and in the high ridges north of the Summersville and Slaven Cabin Road, but does not appear to have minable thickness. The following exposures were noted:

Coal Blossom—No. 878 on Map II.

In road west of Beaver Creek, 1.6 miles east of Calvin; **Little Eagle Coal**; elevation, 2260' B.; observation by Reger and Price.
Coal blossom, at base of heavy sandstone, thickness unknown.

Coal Blossom—No. 879 on Map II.

On a branch of Little Beaver Creek, 0.5 mile S. 21° E. of Calvin; **Little Eagle Coal**; elevation, 2255' B.; observation by Reger and Price.

	Ft.	In.
Coal, at spring, visible.....	1	0

Coal Blossom—No. 880 on Map II.

In road north of Little Beaver Creek, 0.6 mile S. 78° E. of Calvin; **Little Eagle Coal**; elevation, 2260' B.
Coal blossom, thickness unknown.

Little Eagle Coal, Kentucky District.

In Kentucky District the Little Eagle Coal outcrops only in a few of the high ridges south of Gauley River, but does not appear to have minable thickness, the following openings and exposures having been noted:

Coal Blossom—No. 881 on Map II.

On ridge road east of Laurel Branch of Deer Creek, 0.9 mile S. 45° W. of Canvas; **Little Eagle Coal**; elevation, 2250' B.
Coal blossom, thickness unknown.

M. R. Rader Prospect—No. 882 on Map II.

On west hillside, near source of Laurel Branch of Deer Creek, 0.9 mile S. 84° W. of Canvas; **Little Eagle Coal**; elevation, 2205' B.

	Ft.	In.	
Sandstone, massive, coarse, soft, Decota			
Coal	0'	8"	
Slate, dark	1	0	
Coal, slaty	0	2	1 10
<hr style="width: 50%; margin: 0 auto;"/>			
Slate, pavement			

Coal Blossom—No. 883 on Map II.

On ridge road west of Deer Creek, 0.6 mile S. 29° W. of Canvas; **Little Eagle Coal**; elevation, 2260' B.

	Ft.	In.
Coal blossom, slaty coal, about	1	0

Coal Exposure—No. 884 on Map II.

On ridge south of Jims Creek, 1.4 miles southeastward from Deepwell; **Little Eagle Coal**; elevation, 2530' B.; for stratigraphic position and details see Fury Knob Section, page 170.

Quantity of Little Eagle Coal Available.

The following table, compiled by Tucker from a close estimate of the acreage, as limited by Figure 18, shows the probable amount of Little Eagle Coal in the County:

Probable Amount of Little Eagle Coal.

District	Thickness of Coal Assumed Feet	Square Miles	Acres	Cubic Feet of Coal	Short Tons of Coal
Jefferson	1.5	61.10	39,104	2,555,055,360	102,202,214
Grant	1.5	9.95	6,368	416,085,120	16,643,405
Total .....	.....	71.05	45,472	2,971,140,480	118,845,619

GILBERT COAL.

The Gilbert Coal, previously discussed in Chapter VI, page 293, outcrops generally throughout a belt several miles wide, extending from Belva, at the extreme western end of the County, eastward to Camden-on-Gauley. North of the Summersville and Slaven Cabin Road, its horizon is principally under drainage, and south of the Gauley River it is found only in some of the high ridges where it is apparently too thin for commercial mining. Its area of best development is in Grant, Summersville, and Beaver Districts, where it has been opened at numerous points for local domestic use. As a rule it is soft, gaseous, and double- or multiple-bedded, there being a considerable parting near the middle of the seam. In the region of its best development it varies in thickness from 2 to 5 feet. In quality it is a pure coal, very low in ash and phosphorus, reasonably low in sulphur, and high in volatile matter. Judging from its physical and chemical character it would appear to be of the coking type, although no tests are available to verify this conclusion. Its outcrop is delineated on Map II for those regions where it is believed to be of minable thickness and Figure 19 shows the same areas in condensed form.

Gilbert Coal, Jefferson District.

In Jefferson District the Gilbert Coal outcrops principally along the Gauley frontage, but it is too thin for mining at most points. The following openings and prospects were noted:

Coal Exposure—No. 917 on Map II.

On north hillside of Gauley River, 0.6 mile east of Belva; **Gilbert Coal**; elevation, 710' B.

	Ft.	In.
Sandstone, massive, Lower Gilbert	50	0
Shale, dark, Gilbert	10	0
Coal	0	6
Shale, sandy, to grade.....	10	0

Coal Exposure—No. 918 on Map II.

On north side of Gauley River, 2.0 miles S. 80° W. of Swiss;
Gilbert Coal; elevation, 705' B.

	Ft.	In.
Shale, dark, sandy	10	0
Coal	0	6
Sandstone		

Coal Exposure—No. 919 on Map II.

On north side of Gauley River, 1.8 miles S. 76° W. of Swiss;
Gilbert Coal; elevation, 710' B.

	Ft.	In.
Sandstone, shaly		
Coal blossom		
Sandstone, massive		

Coal Exposure—No. 920 on Map II.

On north side of Gauley River, 1.2 miles S. 62° W. of Swiss;
Gilbert Coal; elevation, 715' B.

	Ft.	In.
Sandstone, massive, Lower Gilbert	30	0
Coal	0	2
Slate, black, with iron ore, to railroad.....	7	0

Coal Exposure—No. 921 on Map II.

On north side of Gauley River, 1 mile westward from Swiss;

Gilbert Coal; elevation, 735' B.

	Ft.	In.
Sandstone, shaly, Lower Gilbert	15	0
Shale, sandy	5	0
Coal	0	4
Fire clay shale	2	4

Coal Exposure—No. 922 on Map II.

On north side of Gauley River, 0.7 mile N. 81° W. of Swiss;
Gilbert Coal; elevation, 735' B.

	Ft.	In.
Shale, dark		
Coal	0	6
Concealed	5	0
Sandstone, massive, Dotson		

Coal Exposure—No. 923 on Map II.

On north side of Gauley River, 0.2 mile west of Swiss; **Gilbert Coal**; elevation, 760' B.

	Ft.	In.
Shale, dark		
Sandstone, shaly	1	0
Shale, sandy	6	0
Coal	0	4
Shale, sandy	5	0
Sandstone, massive, cliff		

Coal Exposure—No. 924 on Map II.

On west side of Line Creek, 0.6 mile N. 55° E. of Lockwood; **Gilbert Coal**; elevation, 1055' B.

	Ft.	In.
Sandstone, massive		
Shale, dark	5	0
Coal, slaty .....0' 7"		
Coal, soft .....0 11	1	6
Fire clay shale and concealed to creek.....	4	0

Samuel Bays Farm Mine—No. 925 on Map II.

On south side of Bucklick Branch of Gauley River, 1.6 miles N. 54° W. of Vinton; **Gilbert Coal**; elevation, 1325' B.

	Ft.	In.
Fallen shut, coal, reported.....	2	0

Coal Blossom—No. 926 on Map II.

On east side of Gauley River, 1.6 miles N. 68° W. of Vinton; **Gilbert Coal**; elevation, 1280' B.

Coal blossom, thickness unknown.

O. W. Mason Farm Mine—No. 927 on Map II.

On north side of Gauley River, 0.9 mile N. 30° E. of Albion; **Gilbert Coal**; elevation, 1410' B.; observation by Ray V. Hennen (see Fayette Report of the Survey, page 665).

	Ft.	In.
Shale, buff, sandy .....9' 0" } Gilbert		
Shale, bluish-black, plant fossils } Shale .....10	10	3
abundant .....1 3 |		
Coal, soft .....0' 11½"		
Slate, gray .....0 0½		
Coal, soft (slate floor).....0 6	1	6

Coal Prospect—No. 928 on Map II.

Along road north of Gauley River, 1.0 mile east of Vinton; **Gilbert Coal**; elevation, 1635' B.

Fallen shut, thickness unknown.

Gilbert Coal, Grant District.

In Grant District the Gilbert Coal outcrops principally on the southern tributaries of Peters Creek, and on Meadow and McKee Creeks, as well as on other short tributaries of Gauley River. It has been prospected and mined at numerous points, being the principal source of domestic fuel supply for the region mentioned. The following openings and exposures were noted:

Coal Exposure—No. 929 on Map II.

On a short branch of Peters Creek, 0.7 mile N. 36° E. of Drennen; **Gilbert Coal**; elevation, 1260' B.

	Ft.	In.
Coal, reported	0	6

Coal Exposure—No. 930 on Map II.

In road, north of Peters Creek, 2.0 miles N. 57° E. of Drennen; **Gilbert Coal**; elevation, 1205' B.

	Ft.	In.
Sandstone, massive cliff, Lower Gilbert	40	0
Shale, sandy, with streaks of coal, Gilbert	4	0
Coal	1	0
Shale, dark	5	0
Concealed to creek	10	0

Coal Blossom—No. 931 on Map II.

On road on a branch of Keenan Branch of Peters Creek, 1.7 miles N. 70° E. of Tipton; **Gilbert Coal**; elevation, 1525' B.

Coal blossom, thickness unknown.

David Keenan Farm Mine—No. 932 on Map II.

On south side of Keenan Branch of Peters Creek, 2.4 miles N. 69° E. of Tipton; **Gilbert Coal**; elevation, 1540' B.

	Ft.	In.
Fallen shut, coal, good, reported.....	1	6

Coal Exposure—No. 933 on Map II.

In road, north of Peters Creek, 1.6 miles S. 42° W. of Gilboa; **Gilbert Coal**; elevation, 1270' B.

	Ft.	In.
Sandstone, massive		
Concealed	10	0
Coal, slaty, thickness concealed.....		
Shale and concealed.....	10	0
Sandstone, Dotson		

Coal Blossom—No. 934 on Map II.

On south side of Whitewater Branch of Peters Creek, 3.4 miles east of Drennen; **Gilbert Coal**; elevation, 1585' B.; for stratigraphic position see Burl Section, page 124.

	Ft.	In.
Coal, in bench, reported.....	1	6

Charles Keenan Farm Mine—No. 935 on Map II.

On east side of a south branch of Whitewater Branch of Peters Creek, 2.0 miles north of Keslers Crosslanes; **Gilbert Coal**; elevation, 1620' B.

	Ft.	In.
Fallen shut, coal, with some slate near top, (reported by J. A. Pearson).....	4	0

Ed. Alderson Farm Mine—No. 936 on Map II.

On east side of a south branch of Whitewater Branch of Peters Creek, 1.8 miles north of Keslers Crosslanes; **Gilbert Coal**; elevation, 1625' B.

	Ft.	In.
Shale, dark		
Coal, soft	1'	1"
Slate, dark	0	4
Coal, soft	2	4
	<hr style="width: 50px; margin-left: auto; margin-right: 0;"/>	3
		9
Slate, pavement		

John Halstead Farm Mine—No. 937 on Map II

On east side of a south branch of Whitewater Branch of Peters Creek, 1.6 miles north of Keslers Crosslanes; **Gilbert Coal**; elevation, 1630' B.

	Ft.	In.
1. Shale, dark, Gilbert	8	0
2. Coal, soft	1'	4"
3. Slate, black, bony.....	0	4
4. Coal, soft	2	3
	<hr style="width: 50px; margin-left: auto; margin-right: 0;"/>	3
		11
5. Slate, pavement		

A sample (No. 321R) was collected from Nos. 2 and 4 of section, the composition of which is published under **Mine No. 937** in the Survey Table of Coal Analyses at the end of this Chapter.

Coal Blossom—No. 938 on Map II.

On west side of a south branch of Whitewater Branch of Peters Creek, 1.3 miles north of Keslers Crosslanes; **Gilbert Coal**; elevation, 1675' B.

	Ft.	In.
Coal blossom, visible, 0' 4" to.....	0	5

Newton McCutcheon Farm Mine—No. 939 on Map II.

On north side of Meadow Creek, 1.1 miles N. 15° E. of Keslers Crosslanes; **Gilbert Coal**; elevation, 1630' B.

	Ft.	In.
Sandstone, massive		
Coal, soft	1'	2"
Shale, gray	0	4
Coal, soft, columnar.....	2	3
	<hr style="width: 50px; margin-left: auto; margin-right: 0;"/>	3
		9
Slate, pavement		

Clark Morris Farm Mine—No. 940 on Map II.

On a branch of Whitewater Branch of Peters Creek, 0.8 mile south of Burl; **Gilbert Coal**; elevation, 1610' B.

	Ft.	In.
Shale, dark		
Coal, soft	1'	3"
Slate, bony	0	11
Coal	0	4
Slate, black	0	1
Coal, soft	1	11
	<hr style="width: 50px; margin-left: auto; margin-right: 0;"/>	4
		6
Slate, pavement		

Coal Prospect—No. 941 on Map II.

On south hillside of Whitewater Branch of Peters Creek, 0.9 mile southeast of Burl; **Gilbert Coal**; elevation, 1620' B.

	Ft.	In.
Fallen shut, coal, reported.....	1	0

Coal Exposure—No. 942 on Map II.

In road, on a short branch of Peters Creek, 0.3 mile N. 53° W. of

Gilboa; **Gilbert Coal**; elevation, 1390' B.; for stratigraphic position see Gilboa Section, page 123.

	Ft.	In.
Coal, slaty	1	0

Alice Koontz Farm Mine—No. 943 on Map II.

At the head of a branch of Meadow Creek, 1.3 miles N. 26° W. of Keslers Crosslanes; **Gilbert Coal**; elevation, 1645' B.

	Ft.	In.
Sandstone		
Coal, soft	1'	5"
Slate, bony	0	3
Coal, soft	2	6
	<hr/>	
		4 2

Slate, pavement

Frank Graves Farm Mine—No. 944 on Map II.

On a short branch of Laurel Creek, 1.6 miles N. 30° W. of Keslers Crosslanes; **Gilbert Coal**; elevation, 1635' B.

	Ft.	In.
1. Sandstone, massive		
2. Coal, soft	1'	0"
3. Slate, black, bony.....	0	6
4. Coal, soft, columnar	2	6
	<hr/>	
		4 0
5. Slate, pavement		

A sample (No. 322R) was collected from Nos. 2 and 4 of section, the composition of which is published under **Mine No. 944** in the Survey Table of Coal Analyses at the end of this Chapter.

Martha Burdett Farm Mine (Abandoned)—No. 945 on Map II.

At the head of Mason Branch of Gauley River, 1.7 miles N. 60° E. of Vinton; **Gilbert Coal**; elevation, 1620' B.
Fallen shut, thickness unknown.

Augustus Hamilton Farm Mine—No. 946 on Map II.

On north side of Meadow Creek, 1.2 miles N. 22° E. of Keslers Crosslanes; **Gilbert Coal**; elevation, 1615' B.

	Ft.	In.
Sandstone		
Coal, soft.....	1'	1"
Slate, bony	0	6
Coal, soft, columnar.....	2	7
	<hr/>	
		4 2

Slate, pavement

Betty Painter Farm Mine—No. 947 on Map II.

On south side of Meadow Creek, 0.8 mile N. 48° E. of Keslers Crosslanes; **Gilbert Coal**; elevation, 1655' B.

	Ft.	In.
1. Sandstone, massive		
2. Shale, dark, Gilbert	10	0
3. Coal, soft	1' 3"	
4. Slate, gray	0 3	
5. Coal, soft	2 5	3 11
6. Slate, pavement		

A sample (No. 325R) was collected from Nos. 3 and 5 of section, the composition of which is published under **Mine No. 947** in the Survey Table of Coal Analyses at the end of this Chapter.

Lycurgus Campbell Farm Mine—No. 948 on Map II.

On south side of Meadow Creek, 1.8 miles N. 60° E. of Keslers Crosslanes; **Gilbert Coal**; elevation, 1645' B.

	Ft.	In.
1. Sandstone		
2. Shale, Gilbert	6	0
3. Coal, soft	1' 2"	
4. Slate, bony	0 6	
5. Coal, soft columnar.....	2 6	4 2
6. Slate, pavement		

A sample (No. 326R) was collected from Nos. 3 and 5 of section, the composition of which is published under **Mine No. 948** in the Survey Table of Coal Analyses at the end of this Chapter.

Joseph Martin Farm Mine—No. 949 on Map II.

On north side of Meadow Creek, 1.8 miles N. 58° E. of Keslers Crosslanes; **Gilbert Coal**; elevation, 1675' B.

	Ft.	In.
Slate		
Coal	1' 0"	
Slate, black	0 1	
Coal	0 6	
Shale, gray	1 0	
Coal	2 0	4 7
Shale, pavement		

Wm. Campbell Farm Mine—No. 950 on Map II.

At head of Meadow Creek, 2.1 miles N. 65° E. of Keslers Cross-lanes; **Gilbert Coal**; elevation, 1680' B.

	Ft.	In.
Fallen shut, coal, with 2° of slate near middle, reported	4	0

Mary Boller Farm Mine—No. 951 on Map II.

At head of a branch of Meadow Creek, 0.4 mile west of Sparks; **Gilbert Coal**; elevation, 1705' B.

	Ft.	In.
1. Shale, dark.....	10	0
2. Coal, soft	1' 1"	
3. Coal, slaty	0 2	
4. Shale, bony	1 3	
5. Coal, soft, columnar.....	2 5	4 11
6. Slate, pavement		

A sample (No. 328R) was collected from Nos. 2 and 5 of section, the composition of which is published under **Mine No. 951** in the Survey Table of Coal Analyses at the end of this Chapter.

James Skaggs Farm Mine—No. 952 on Map II.

On Battle Run of Gauley River, 0.4 mile N. 67° W. of Sparks; **Gilbert Coal**; elevation, 1705' B.

	Ft.	In.
Shale, dark, Gilbert	6	0
Coal, soft	1' 2"	
Shale, bony	0 11	
Coal, bony	0 4	
Coal, soft	2 4	4 9
Slate, pavement		

O. E. Dorsey Farm Mine—No. 953 on Map II.

On Battle Run of Gauley River, 0.3 mile N. 32° W. of Sparks; **Gilbert Coal**; elevation, 1705' B.

	Ft.	In.
1. Slate, black		
2. Coal	1' 0"	
3. Shale, bony.....	1 6	
4. Coal, bony.....	0 4	
5. Coal, soft, columnar.....	2 5	5 3
6. Slate, pavement		

A sample (No. 327R) was collected from Nos. 2 and 5 of section, the composition of which is published under **Mine No. 953** in the Survey Table of Coal Analyses at the end of this Chapter.

Coal Blossom—No. 954 on Map II.

On Battle Run of Gauley River, 0.4 mile N. 81° E. of Sparks; **Gilbert Coal**; elevation, 1785' B.

Coal blossom, thickness unknown.

John Halstead Farm Mine—No. 955 on Map II.

On a branch of McKee Creek, 0.7 mile N. 66° W. of Gad; **Gilbert Coal**; elevation, 1705' B.

	Ft.	In.
Shale, dark	10	0
Coal	1'	0"
Slate, gray	0	1
Coal	0	2
Shale, gray	1	8
Coal, bony	0	4
Coal, soft	0	11
Coal, bony	1	0
	5	2
Shale, pavement		

Gilbert Coal, Summersville District.

In Summersville District, the Gilbert Coal outcrops on McKee Creek, Salmon Run, and Muddlety Creek, as also on certain other short tributaries of Gauley River. The following openings and exposures were noted:

Coal Blossom—No. 956 on Map II.

On road, north side of Peters Creek, 0.7 mile N. 75° E. of Gilboa; **Gilbert Coal**; elevation, 1425' B.

	Ft.	In.
Shale, sandy		
Coaly slate	2	0
Fire clay shale, sandy.....		

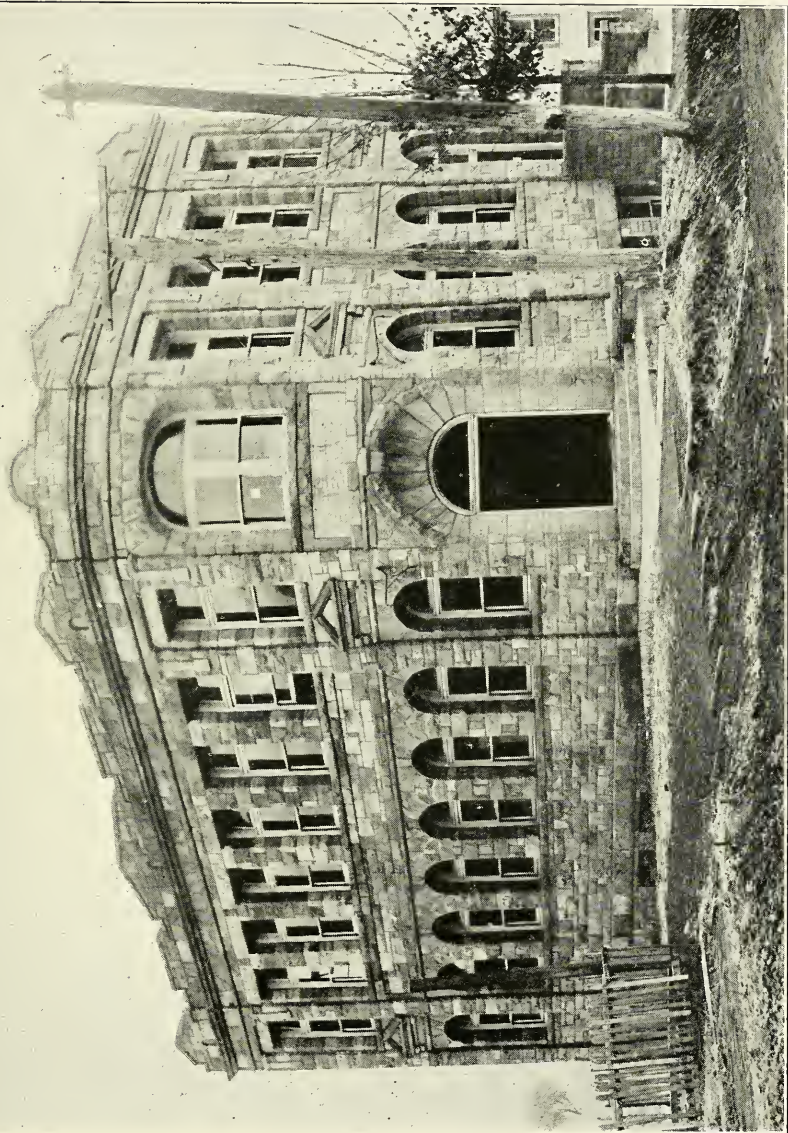


PLATE XXX. — Farmers and Merchants Bank at Summersville, built of Lower Gilbert and Dotson Sandstones.

Photo by E. F. Harris.

Samuel Sebert Farm Mine—No. 957 on Map II.

On Sugarcamp Run of Rockcamp Branch of Peters Creek, 3.0 miles west of Summersville; Gilbert Coal; elevation, 1545' B.

	Ft.	In.
1. Sandstone		
2. Shale, dark, Gilbert	4	0
3. Coal, soft	1' 4"	
4. Shale, gray	1 10	
5. Coal, soft	1 2	4 4
6. Slate, pavement		

A sample (No. 318R) was collected from Nos. 3 and 5 of section, the composition of which is published under Mine No. 957 in the Survey Table of Coal Analyses at the end of this Chapter.

Coal Blossom—No. 958 on Map II.

On road on hillside west of a branch of McKee Creek, 0.8 mile N. 53° W. of Gad; Gilbert Coal; elevation, 1715' B.
Coal blossom, thickness unknown.

Coal Blossom—No. 959 on Map II.

On hillside east of McKee Creek, on road, 1.9 miles S. 42° W. of Summersville; Gilbert Coal; elevation, 1785' B.
Coal blossom, thickness unknown.

Coal Blossom—No. 960 on Map II.

On a branch of Salmon Run of Gauley River, 0.8 mile east of Gad; Gilbert Coal; elevation, 1840' B.

	Ft.	In.
Sandstone, massive, Lower Gilbert.....	55	0
Coal blossom, thickness concealed.....		
Concealed and shale, sandy.....	5	0

Coal Exposure—No. 961 on Map II.

On road, at head of Salmon Run, 1.1 miles south of Summersville; Gilbert Coal; elevation, 1905' B.

	Ft.	In.
Sandstone		
Coal	1	8
Fire clay shale		

H. Cutlip Coal Exposure—No. 962 on Map II.

On west side of Muddlety Creek, 2.2 miles N. 49° E. of Summersville; **Gilbert Coal**; elevation, 1845' B.; observation by Price.

Coal blossom, thickness unknown.

Coal Exposure—No. 963 on Map II.

On south side of Glade Creek near mouth, 2.4 miles N. 40° E. of Summersville; **Gilbert Coal**; elevation, 1845' B.; observation by Price.

	Ft.	In.
Sandstone, Lower Gilbert		
Coal	0	3
Shale	1	0
Bone	0	2
Shale	1	0
Shale, concealed, and sandstone.....	15	0
Sandstone, in Muddlety Creek, Dotson		

Gilbert Coal, Hamilton District.

In Hamilton District the Gilbert Coal outcrops on Persinger Creek, Crooked Run, and other short tributaries of Gauley River, but does not appear to have minable thickness except at the extreme southern end. The following exposures were noted:

L. H. Armstrong Water Well Prospect—No. 964 on Map II.

On a short branch of Gauley River, 2.3 miles southwest of Persinger; **Gilbert Coal**; elevation, 2000' B.; reported as follows by L. H. Armstrong:

	Ft.	In.
Sandstone, Lower Gilbert	16	0
Coal	4	0
Sandstone, hard		

Coal Blossom—No. 965 on Map II.

On road, north side of Gauley River, 1.4 miles S. 13° W. of Persinger; **Gilbert Coal**; elevation, 2055' B.; for stratigraphic position see Persinger Ford (North); Section, page 150.

Coal blossom, thickness unknown.

Coal Blossom—No. 966 on Map II.

On Persinger Creek, 0.2 mile S. 30° W. of Persinger; **Gilbert Coal**; elevation, 1995' B.; observation by Reger and Price.
Coal blossom, thickness unknown.

Coal Blossom—No. 967 on Map II.

On Persinger Creek at Persinger village; **Gilbert Coal**; elevation, 1970' B.; observation by Reger and Price.
Coal blossom, thickness unknown.

Gilbert Coal, Beaver District.

In Beaver District the Gilbert Coal outcrops on Beaver Creek and other tributaries of Gauley River, having been mined for local domestic use at several points. The following openings and exposures were noted:

Coal Blossom—No. 968 on Map II.

On road, east hillside of Crooked Run, 0.3 mile west of Nile; **Gilbert Coal**; elevation, 2080' B.
Coal blossom, thickness unknown.

Coal Blossom—No. 969 on Map II.

In road along a short branch of Beaver Creek, 1.6 miles S. 43° W. of Beaver; **Gilbert Coal**; elevation, 2200' B.
Coal blossom, thickness unknown.

Coal Blossom—No. 970 on Map II.

In ridge road, west side of Gauley River, 1.5 miles N. 60° W. of Curtin; **Gilbert Coal**; elevation, 2315' B.

	Ft.	In.
Sandstone, massive, Lower Gilbert		
Concealed and shale, Gilbert	15	0
Coal blossom , thickness unknown.....		
Fire clay shale.....		

Bina Sparks Farm Mine—No. 971 on Map II.

On east side of Beaver Creek, 0.2 mile S. 42° E. of Beaver; **Gilbert Coal**; elevation, 2155' B.

	Ft.	In.
1. Coal , soft	2	4
2. Slate , pavement		

A sample (336R) was collected from No. 1 of section, the composition of which is published under **Mine No. 971** in the Survey Table of Coal Analyses at the end of this Chapter.

H. McCarty Prospect—No. 972 on Map II.

On east side of Beaver Creek, 0.1 mile east of Beaver village; **Gilbert Coal**; elevation, 2155' B.

	Ft.	In.
Fallen shut, coal, reported.....	2	0

Coal Exposure—No. 973 on Map II.

In road east of Beaver Creek, 0.1 mile east of Beaver village; **Gilbert Coal**; elevation, 2155' B.; for stratigraphic position and details see Beaver Section, page 151.

Coal Blossom—No. 974 on Map II.

In ridge road, north side of Gauley River, 1.0 mile north of Curtin; **Gilbert Coal**; elevation, 2430' B.

Coal blossom, thickness unknown.

James Ward Farm Mine—No. 975 on Map II.

At the head of a short branch of Gauley River, 1.1 miles northwest of Cranberry Station; **Gilbert Coal**; elevation, 2400' B.; for stratigraphic position and details see Cranberry (West) Section, page 156.

Floyd Atkinson Farm Mine—No. 976 on Map II.

On Spruce Run of Rockcamp Run of Gauley River, 0.7 mile south of Allingdale; **Gilbert Coal**; elevation, 2175' B.

	Ft.	In.
Sandstone, massive		
Coal, soft	1'	9"
Coal, slaty	0 7	2 4

W. B. Given Farm Mine—No. 977 on Map II.

On north side of Rockcamp Run of Gauley River, 0.5 mile southwest of Allingdale; **Gilbert Coal**; elevation, 2125' B.

	Ft.	In.
Sandstone, massive, cliff, Lower Gilbert		
Coal, soft	1'	6"
Coal, bony	0 4	1 10
Slate, pavement		

Coal Exposure—No. 978 on Map II.

At falls of Rockcamp Run of Gauley River, 0.8 mile southwest of Allingdale; **Gilbert Coal**; elevation, 2110' B.

	Ft.	In.
Sandstone, massive, white (lower 20' makes falls), Lower Gilbert , 50' to.....	60	0
Coal , slaty	0' 3"	
Coal , soft	1 6	1 9
Shale and concealed to run.....	5	0

Coal Exposure—No. 979 on Map II.

On west side of Strouds Creek, 0.4 mile northwest of Allingdale; **Gilbert Coal**; elevation, 2075' B.

Coal blossom, thickness unknown.

Coal Exposure—No. 980 on Map II.

In road, east side of Strouds Creek, 0.4 mile north of Allingdale; **Gilbert Coal**; elevation, 2080' B.

	Ft.	In.
Coal blossom , visible.....	1	6

Gilbert Coal, Kentucky District.

In Kentucky District the **Gilbert Coal** outcrops only in a few of the high ridges in the northern half, but does not appear to have minable thickness, the following exposures having been noted:

Coal Blossom—No. 981 on Map II.

On ridge road at head of Little Laurel Creek, 0.5 mile N. 80° E. of Nettie; **Gilbert Coal**; elevation, 2660' B.; for stratigraphic position see Lowland Section, page 163.

Coal blossom, thickness unknown.

Coal Exposure—No. 982 on Map II.

On ridge road at head of Jims Creek, 0.5 mile S. 18° E. of Nettie;
Gilbert Coal; elevation, 2725' B.

	Ft.	In.
Sandstone, massive, slightly pebbly, Lower Gilbert.....	20	0
Shale, dark and sandy, Gilbert.....	30	0
Coal, slaty	0	8
Shale, sandy, and concealed.....	55	0

Coal Blossom—No. 983 on Map II.

On ridge road, north of Deer Creek, 0.7 mile northeast of Donald;
Gilbert Coal; elevation, 2405' B.

Coal blossom, thickness unknown.

Coal Blossom—No. 984 on Map II.

On ridge road, north of Deer Creek, 0.6 mile northeast of Donald;
Gilbert Coal; elevation, 2370' B.

Coal blossom, thickness unknown.

Gilbert Coal, Wilderness District.

In Wilderness District the Gilbert Coal outcrops in some of the high ridges in the northern half but does not appear to have minable thickness, the following openings and exposures having been noted:

Coal Blossom—No. 985 on Map II.

On ridge at head of Elevenmile Fork of Anglins Creek, 1.6 miles N. 83° W. of Hominy Falls; **Gilbert Coal**; elevation, 2880' B.

Coal blossom, thickness unknown.

Coal Blossom—No. 986 on Map II.

On ridge road at head of Elevenmile Fork of Anglins Creek, 1.5 miles west of Hominy Falls; **Gilbert Coal**; elevation, 2860' B.

Coal blossom, thickness unknown.

Dr. James Dunbar Farm Mine—No. 987 on Map II.

In high knob south of Gauley River, 0.2 mile north of Mt. Nebo;
Gilbert Coal; elevation, 2080' B.

Fallen shut, thickness unknown.

James King Farm Mine—No. 988 on Map II.

At head of Collision Creek near summit of Fowler Knob, 0.5 mile southeast of Mt. Nebo; **Gilbert Coal**; elevation, 2175' B.

	Ft.	In.
1. Shale, dark		
2. Slate, bony	0	5
3. Coal, soft	1	5
4. Slate, pavement		

A sample (No. 346R) was collected from No. 3 of section, the composition of which is published under **Mine No. 988** in the Survey Table of Coal Analyses at the end of this Chapter.

Coal Blossom—No. 989 on Map II.

On ridge road near headwaters of Collision Creek, 1.3 miles south-east of Mt. Nebo; **Gilbert Coal**; elevation, 2210' B.

Coal blossom, thickness unknown.

Coal Blossom—No. 990 on Map II.

On ridge road south of Gauley River, 1.1 miles S. 75° W. of Mt. Nebo; **Gilbert Coal**; elevation, 2040' B.

Quantity of Gilbert Coal, Available.

The following table, compiled by Tucker from a close estimate of the acreage, as outlined and limited by Figure 19, shows the probable amount of minable Gilbert Coal in the County:

Probable Amount of Gilbert Coal.

District	Thickness of Coal Assumed Feet	Square Miles	Acres	Cubic Feet of Coal	Short Tons of Coal
Grant	2.5	8.55	5,472	595,900,800	23,836,032
Summersville	2.0	14.70	9,408	819,624,960	32,784,998
Hamilton	1.5	8.45	5,408	353,358,720	14,134,349
Beaver	1.5	45.00	28,800	1,881,792,000	75,271,680
Totals		76.70	49,088	3,650,676,480	146,027,059

MINABLE COALS OF THE NEW RIVER GROUP OF THE POTTSVILLE SERIES.

SEWELL (SHARON?) COAL.

The Sewell (Sharon?) Coal, previously discussed in Chapter VII, pages 336-8, is the principal minable seam of the New River Group in the county. North of the Gauley River it outcrops only at a few points in the deep gorge of that stream, its horizon elsewhere being under drainage, the only information concerning it being contained in the records of a few scattered tests for oil and gas, as exhibited in Chapter IX, and in a few core drill holes, the records of which are given in the earlier pages of this Chapter. Some of these various borings reveal coal of apparently minable thickness while others show little or none. In view of the information contained in them and of the well-known fact that the coals of the New River Group gradually become patchy, thin out, and disappear entirely northward, it would seem that the presence of the Sewell as a minable seam north of Gauley could only be proved by extensive core drilling, and in many localities the results would probably be a source of disappointment. In view of the limited underground information now at hand in this portion of the county it is safe to indicate only scattered bodies of coal, and such has been done on Figure 20.

South of the Gauley River the Sewell outcrops at various points along the river, depending chiefly on its meanders, and along several of its major tributaries in Beaver, Richwood, Kentucky, and Wilderness Districts, there being a sufficient number of prospects and mines available to warrant the statement that this portion of the county contains a large amount of minable Sewell Coal. In the wide plateaus between the major streams, numerous core tests have been made, principally in Kentucky District, but unfortunately only a limited number of the records has been given the Survey by those who drilled them. The evident reluctance of the operators toward the publication of these borings gives rise to the probability that some of them may have shown disappointing results.

In the region of its outcrop in the county the Sewell is usually a double-bedded seam, varying in thickness from 2 to 6 feet, there frequently being no parting when the former figure is approached. In physical appearance it has the soft columnar structure typical of the New River Group, and in quality it is very pure, being low in sulphur, ash, and phosphorus. It is also low in volatile matter, being of the semi-smokeless type, especially suitable for steam, bunkering, or smelting purposes, its British Thermal Unit value being very high. Its almost universally low-ash content would indicate that it would not make an ideal coking coal if used by itself, as the product would not have the necessary strength to uphold the customary blast-furnace load, but it is believed that it would be well adapted for mixing with high-ash coals, making a mixture that would have the necessary strength. It is being mined commercially at Saxman, on Laurel Creek of Cherry River, and elsewhere in the Gauley drainage is mined at several points for locomotive fuel on logging railroads.

The outcrop of the Sewell is delineated on Map II, and on Figure 20 the area in which it is known or believed to be of minable thickness is indicated, that portion north of Gauley River being shown by broken lines as evidence of its patchy nature.

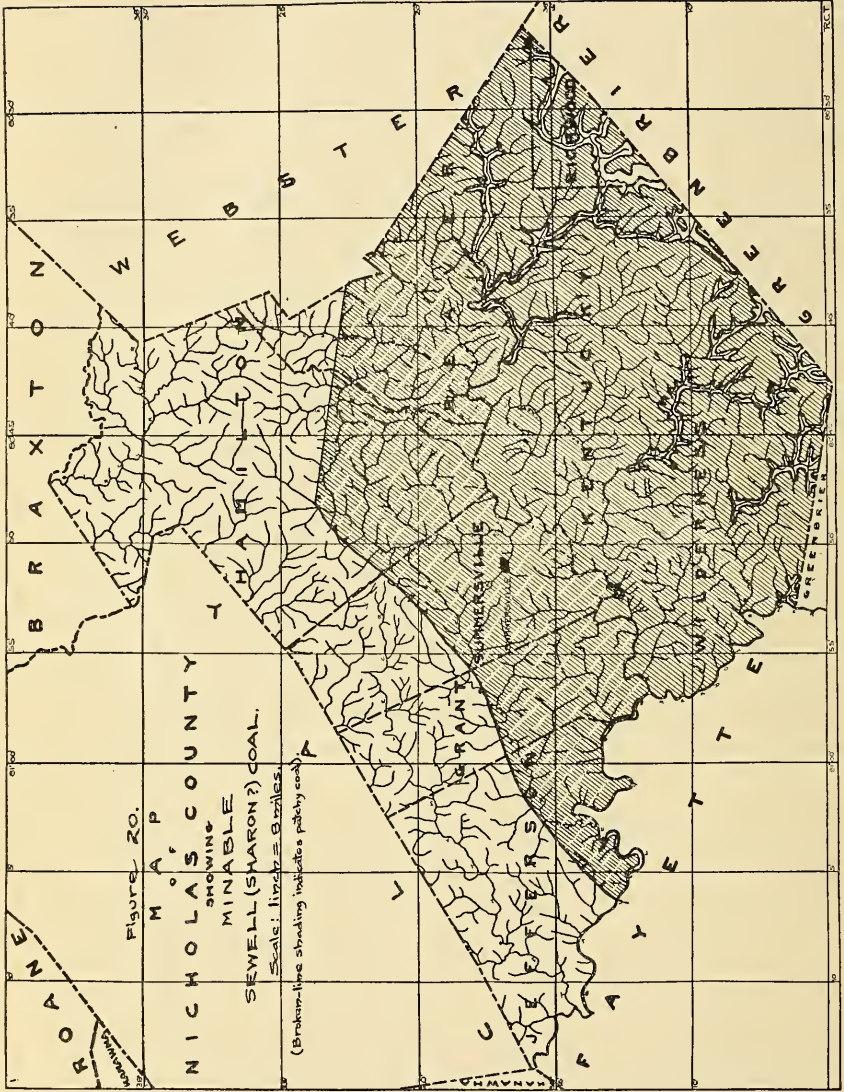


Figure 20

Sewell (Sharon?) Coal, Jefferson District.

In Jefferson District the Sewell Coal outcrops only at a few points in the deep gorge of Gauley River, the following openings having been noted:

Kanawha & Michigan Railway Prospect—No. 1151 on Map II.

On north side of Gauley River, 0.9 mile S. 67° E. of Vinton; **Sewell Coal**, elevation, 1075' B.; for stratigraphic position see Panther Mountain Section, page 119.

	Ft.	In.
1. Shale, sandy		
2. Coal, soft	3'	0"
3. Slate, black, bony.....	0 6	3 6
4. Shale, gray		

A sample (No. 313R) was collected from No. 2 of section, the composition of which is published under **Mine No. 1151** in the Survey Table of Coal Analyses at the end of this Chapter.

Flynn Lumber Company Mine—No. 1152 on Map II.

Along railroad on north bank of Gauley River, 3.7 miles S. 47° E. of Swiss; **Sewell Coal**; elevation, 800' B.

	Ft.	In.
1. Sandstone, massive	15	0
2. Coal, soft, columnar, 2' 8" to.....	3	0
3. Slate, black, coaly.....	1	0
4. Sandstone, visible	1	0
5. Concealed to Gauley River.....	35	0

A sample (No. 308R) was collected from No. 2 of section, the composition of which is published under **Mine No. 1152** in the Survey Table of Coal Analyses at the end of this Chapter. Coal from the above opening is used for steam fuel on the logging locomotives of the Flynn Lumber Company, 3 men being employed, producing a weekly output of 75 tons.

Coal Prospect—No. 1153 on Map II.

Falls District, Fayette County, on south side of Gauley River, 2 miles southwest of Albion; **Sewell Coal**; elevation, 925' B.; observation by Ray V. Hennen (see Fayette Report, page 680).

	Ft.	In.
Coal, clean and soft, reported by J. H. Hess, about 100' above the river.....	4	1

Squire Halstead Farm Mine—No. 1154 on Map II.

Falls District, Fayette County, in Flatrock Hollow of Gauley River, 1.8 miles westward from Albion; **Sewell Coal**; elevation, 915' B.; observation by Mr. Halstead. (See Volume II(A), pages 224-225, by I. C. White, and Fayette Report, page 680, by Ray V. Hennen).

	Ft.	In.
Sandstone, Nuttall, great cliff.....		
Coal, Hughes Ferry, 10" to.....	1	8
Sandstone and shale with thin coals (2-3).....	125	0
Sandstone, heavy, (Lower Guyandot).....	15	0
Coal, soft	1' 2"	
Coal, hard	0 2	
Coal, soft	2 2	3 6
Shales and soft sandstone.....	25	0
Sandstone, massive, (Raleigh), cliffs to Gauley River.....	55	0

Sewell (Sharon?) Coal, Grant District.

In Grant District the Sewell Coal outcrops only in the deep gorge of Gauley River, there being no prospects, so far as known. The following opening, however, located in Fayette County, near the mouth of Meadow River, illustrates its occurrence in that region:

Coal Prospect—No. 1154A on Map II.

In Falls District, Fayette County, on south side of Gauley River, 0.5 mile northwest of Carnifex Ferry; **Sewell Coal**; elevation, 1155' B.; observation by Ray V. Hennen; (see Fayette County Report, page 681).

	Ft.	In.
1. Sandstone, grayish-white, pebbly, making cliff, Lower Guyandot, visible.....	20	0
2. Shale, sandy, hard, (Hartridge).....	1	3
3. Coal, medium-hard, columnar.....	1	10
4. Shale, sandy, visible.....	1	0
5. Concealed to Gauley River.....	10	0

A sample (No. 914H) was collected from No. 3 of section by Mr. Hennen, the composition of which is published under **Mine No. 1154A** in the Survey Table of Coal Analyses at the end of this Chapter.

Sewell (Sharon?) Coal, Summersville District.

In Summersville District the Sewell Coal outcrops only at the bend of Gauley where it passes around Long Point.

Here it is said to be visible at times of extremely low water, a statement that could not be verified as the water covered the outcrop at the time of the writer's visit, nothing being visible except the roof shale; the following data having been obtained:

Coal Exposure—No. 1155 on Map II

In bed of Gauley River, just east of Long Point, 1.3 miles N. 53° W. of Mt. Nebo; **Sewell Coal**; elevation, 1460' B.; for stratigraphic position see Long Point of Gauley Section, page 126.

	Ft.	In.
Shale, dark, Hartridge, visible.....	1	4
Coal, in river, reported 3' 0" to.....	4	0

Sewell (Sharon?) Coal, Hamilton District.

In Hamilton District the Sewell Coal does not outcrop, its horizon being approximately 200 feet below drainage along the gorge of Gauley River, and the only information concerning it in this region being contained in the core tests published in the beginning of this Chapter, and in the McQueen Gas Well (23) published in connection with the section for Hookersville, page 149.

Sewell (Sharon?) Coal, Beaver District.

In Beaver District the Sewell Coal outcrops in certain localities on Gauley River below Cranberry Station, and on Cranberry and Cherry Rivers, the following openings having been noted:

Landsdowne Coal & Land Company Prospect— No. 1156 on Map II.

On west side of Gauley River, opposite Cranberry Station; **Sewell Coal**; elevation, 1940' B.; for stratigraphic position and details see Cranberry (Southeast) Section, page 158.

**Cherry River Boom & Lumber Company Prospect—
No. 1157 on Map II.**

On south side of Cranberry River, 0.7 mile above Barrenshe Run and 5 miles east of Cranberry Station; **Sewell Coal**; elevation, 2325' B.

	Ft.	In.
Slate, dark		
Coal, soft.....	0'	10"
Slate, black, bony.....	1	2
Coal, soft	1	1
	<u> </u>	3 1
Slate, pavement'		

**Cherry River Boom & Lumber Company Prospect—
No. 1158 on Map II.**

On Bear Run of Cranberry River, 5.8 miles east of Cranberry Station; **Sewell Coal**; elevation, 2300' B.

	Ft.	In.
Sandstone, shaly		
Shale, black, with <i>Naiadites</i> fossils, Hartridge		
Coal, medium-soft	1	3
Concealed by water, floor of coal?.....		

**Cherry River Boom & Lumber Company Prospect—
No. 1159 on Map II.**

On east side of Cherry River, 0.2 mile S. 18° W. of Coal Siding; **Sewell Coal**; elevation, 1990' B.

	Ft.	In.
Sandstone, massive, Lower Guyandot	15	0
Coal	1'	5"
Slate, dark	0	7
Coal, soft	2	2
	<u> </u>	4 2
Sandstone, pavement		

A sample (No. 370R) was collected from Nos. 2 and 4 of section, the composition of which is published under **Mine No. 1159** in the Survey Table of Coal Analyses at the end of this Chapter.

**Cherry River Boom & Lumber Company Prospect—
No. 1160 on Map II.**

On east side of Cherry River, 0.3 mile south of Coal Siding; **Sewell Coal**; elevation, 1990' B.
Fallen shut, thickness unknown.

Cherry River Boom & Lumber Company Prospect—
No. 1161 on Map II.

On east side of Cherry River, 0.8 mile N. 57° W. of Holcomb;
Sewell Coal; elevation, 2140' B.

	Ft.	In.
Shale, dark		
Coal, medium-soft	3	6
Sandstone, shaly, Welch.....	20	0

L. D. Copley Wagon Mine (Baltimore & Ohio Railroad
Property)—No. 1162 on Map II.

On north bank of Cherry River, 0.2 mile east of Fenwick; Sewell
Coal; elevation, 2365' B.

	Ft.	In.
1. Sandstone, massive cliff, Lower Guyandot.....		
2. Concealed	15	0
3. Shale, dark, Hartridge.....	3	0
4. Cannel slate	1	1
5. Coal, soft	2' 7"	
6. Coal, bony	0 11	3 6
7. Slate, pavement		

A sample (No. 362R) was collected from No. 5 of section,
the composition of which is published under Mine No. 1162
in the Survey Table of Coal Analyses at the end of this
Chapter.

The output of the above mine, 4 tons or more daily, is
hauled by wagon to Fenwick and the neighboring region.

Coal Prospect—No. 1163 on Map II.

On north side of Gauley River, 3.2 miles S. 72° W. of Curtin;
Sewell Coal; elevation, 1775' B.

	Ft.	In.
Coal, reported, 4' 0" to.....	5	0

Sewell (Sharon?) Coal, Richwood District.

In Richwood District the Sewell Coal outcrops on the
waters of Cherry River, but apparently no prospects showing
minable coal have been made within its limits, the following
exposures having been noted:

Coal Blossom—No. 1164 on Map II.

On south side of Cherry River, just south of Richwood; **Sewell Coal**; elevation, 2550' B.

Coal blossom, at spring, thickness unknown.

Coal Blossom—No. 1165 on Map II.

On road, 1.5 miles S. 13° W. of Richwood; **Sewell Coal**; elevation, 2695' B.

	Ft.	In.
Coal blossom, visible.....	1	0

Coal Blossom—No. 1166 on Map II.

On road, 1.6 miles south of Richwood; **Sewell Coal**; elevation, 2800' B.

Coal blossom, thickness unknown.

Coal Blossom—No. 1167 on Map II.

On private road, at Greenbrier-Nicholas County Line, 1.9 miles S. 5° W. of Richwood; **Sewell Coal**; elevation, 2990' B.

Coal blossom, thickness unknown.

The following is a tipple mine, located in Greenbrier County, about 1½ miles from the Nicholas Line, being in the southward extension of the Kovan Syncline of Webster County, the coal being of good thickness and quality:

Elk Lick Coal Company Mine—No. 1167A on Map II

In Falling Springs District, Greenbrier County, on south side of North Fork of Cherry River, approximately 4.5 miles N. 87° E. of Richwood and 2.7 miles S. 8° W. of the common corner of Nicholas, Webster, and Greenbrier Counties; **Sewell Coal**; elevation, 3379' L.

	Ft.	In.
1. Slate, dark		
2. Coal, soft, columnar.....	4	6
3. Slate, pavement		

"Principal office, Richwood, W. Va.; daily output, 100 tons; 15 miners and 9 laborers employed; mule haulage; greatest rise, south-east; coal used for railroad fuel by Cherry River Boom & Lumber Company; H. C. Livesay, Timekeeper, authority for mine data; sample (No. 211R) collected in First Left from No. 2 of section, for composition of which see Mine No. 1167A in the Survey Table of Coal Analyses at the end of this Chapter."

Sewell (Sharon?) Coal. Kentucky District.

In Kentucky District the Sewell Coal outcrops in certain localities along Gauley River, on Cherry River and some of its tributaries, being mined commercially on Laurel Creek, and is above drainage on the upper waters of Hominy Creek. The following mines and openings were noted:

**Pardee & Curtin Lumber Company Prospect—
No. 1168 on Map II.**

On west side of Cherry River, 0.5 mile S. 38° E. of Curtin; **Sewell Coal**; elevation, 1965' B.

	Ft.	In.
1. Sandstone, massive		
2. Coal, medium-soft	1'	6"
3. Slate, dark	0	4
4. Coal, medium-soft	2	5
	4	3
5. Shale, gray	10	0
6. Sandstone, massive, to railroad grade.....	15	0

A sample (No. 371R) was collected from Nos. 2 and 4 of section, the composition of which is published under **Mine No. 1168** in the Survey Table of Coal Analyses at the end of this Chapter.

**Baltimore & Ohio Railroad Company Mine—
No. 1169 on Map II.**

On west side of Cherry River, 0.3 mile S. 50° W. of Coal Siding; **Sewell Coal**; elevation, 1965' B.

	Ft.	In.
Sandstone, massive, Lower Guyandot	20	0
Slate, dark	0	3
Coal	1'	5"
Slate, dark	0	2
Coal	2	8
	4	3
Sandstone, cliff, Welch , to river.....	25	0

At the above opening an attempt was once made to operate the coal for commercial shipment but the mine was abandoned, presumably because of the steep westward dip.

Charles Bennett Farm Mine—No. 1170 on Map II.

On south side of Cherry River, 0.5 mile S. 83° W. of Holcomb;
Sewell Coal; elevation, 2165' B.

	Ft.	In.
1. Coal blossom		
2. Sandstone, shaly	4	0
3. Shale, dark	2	0
4. Coal, soft	2	7
5. Slate, pavement		

A sample (No. 369R) was collected from No. 4 of section, the composition of which is published under **Mine No. 1170** in the Survey Table of Coal Analyses at the end of this Chapter.

Charles Bennett Prospect—No. 1171 on Map II.

On south side of Cherry River, 0.4 mile S. 70° W. of Holcomb;
Sewell Coal; elevation, 2190' B.

	Ft.	In.
Slate, dark		
Coal, estimated (mine partly full of water).....	2	0

Craig-Deitz Coal Company Prospect—No. 1172 on Map II.

On hillside west of Cherry River, 0.6 mile N. 42° W. of Fenwick;
Sewell Coal; elevation, 2335' B.

	Ft.	In.
Coal, visible.....	0	8

Craig-Deitz Coal Company Prospect—No. 1173 on Map II.

On hillside west of Cherry River, 2.0 miles N. 44° W. of Fenwick;
Sewell Coal; elevation, 2355' B.

	Ft.	In.
Sandstone, massive cliff, Lower Guyandot.....	40	0
Concealed	18	0
Shale, dark, Hartridge.....	5	0
Coal, soft.....	1	8
Slate, pavement		

Coal Prospect—No. 1174 on Map II.

On road, west bank of Laurel Creek, 0.7 mile S. 69° W. of Fenwick; Sewell Coal; elevation, 2355' B.; for stratigraphic position see Fenwick Section, page 162.

Fallen shut, thickness unknown.

On Laurel Creek the coal is being mined commercially by the Saxman Coal & Coke Company. The mine equipment includes 50 beehive coke ovens not at present in blast as the large manufacturing concerns at Richwood consume the entire output for steam fuel.

Saxman Coal & Coke Company (No. 1 Mine)—No. 1175 on Map II.

On east side of Laurel Creek, 0.1 mile east of Saxman; **Sewell Coal**; elevation, 2365' B.

	Ft.	In.
1. Slate, dark		
2. Coal, soft	2	7½
3. Slate, pavement		

"Principal office, 1414 Commonwealth Building, Philadelphia, Pa.; coal owned by Gauley Coal Land Company; daily capacity, 300 tons; 50 miners and 30 laborers employed; electric haulage; coal shipped to Richwood for steam purposes; greatest rise, southeast; sample (No. 375R) collected from North Section Heading, Room No. 20, for composition of which see **Mine No. 1175** in the Survey Table of Coal Analyses at the end of this Chapter. G. R. Saxman, General Manager, authority for mine data."

The mine data concerning output, labor, etc., listed under the above mine include Mine No. 3 of the same company, described below.

**Saxman Coal & Coke Company (No. 2 Mine) (Abandoned)--
No. 1176 on Map II.**

On east side of Laurel Creek, 0.6 mile south of Saxman; **Sewell Coal**; elevation, 2390' B.

	Ft.	In.
Slate, dark		
Coal, soft'	3	4
Sandstone, pavement		

The above operation has been abandoned, the section being measured at the mouth of the old mine.

**Saxman Coal & Coke Company (No. 3 Mine)—No. 1177 on
Map II.**

On west side of Laurel Creek, 1.4 miles S. 86° W. of Saxman; **Sewell Coal**; elevation, 2435' B.

	Ft.	In.
1. Sandstone		
2. Shale, dark, Hartridge	15	0
3. Coal , soft, columnar.....	3	10
4. Shale, gray, with plant roots.....	2	0
5. Sandstone, massive		

A sample (No. 373R) was collected from No. 3 of section in South Section Heading No. 52, for composition of which see **Mine No. 1177** in the Survey Table of Coal Analyses at the end of this Chapter. The data on output, labor, etc., are included under the description of No. 1 Mine (1175) on a previous page.

**Saxman Coal & Coke Company (No. 4 Mine)—No. 1178 on
Map II.**

On east side of Laurel Creek, 1.5 miles south of Saxman; **Sewell Coal**; elevation, 2520' B.

	Ft.	In.
1. Shale, dark, Hartridge , visible.....	10	0
2. Coal , soft, 2' 0" to.....	2	11
3. Slate, pavement		

A sample (No. 374R) was collected from No. 2 of section, 140 feet up the main entry, for composition of which see **Mine No. 1178** in the Survey Table of Coal Analyses at the end of this Chapter. Shipment from the above opening had not yet begun at the time of the writer's visit (November, 1917).

**John A. Bailes Prospect (E. A. Gwinn Opening)—No. 1179 on
Map II.**

On hillside west of Laurel Creek, 2.7 miles S. 7° W. of Saxman; **Sewell Coal**; elevation, 2685' B.

	Ft.	In.
Slate		
Coal , soft, columnar.....	3	1
Slate, pavement		

Gauley Coal Land Company, Wagon Mine—No. 1180 on Map II.

On hillside north of Pack Fork of Laurel Creek, 3.0 miles S. 7° W. of Saxman; **Sewell Coal**; elevation, 2720' B.

	Ft.	In.
1. Shale, dark, Hartridge	10	0
2. Coal , soft	3	4
3. Slate, pavement'		

A sample (No. 366R) was collected from No. 2 of section, the composition of which is published under **Mine No. 1180** in the Survey Table of Coal Analyses at the end of this Chapter.

John A. Bailes Prospect—No. 1181 on Map II.

On south side of Nixon Branch of Laurel Creek, 2.6 miles S. 20° E. of Saxman; **Sewell Coal**; elevation, 2995' B.

	Ft.	In.
Fallen shut, coal, reported, 4' 0" to.....	5	0

John A. Bailes Coal Stripping—No. 1182 on Map II.

On south side of Nixon Branch of Laurel Creek, 2.8 miles S. 22° E. of Saxman; **Sewell Coal**; elevation, 2995' B.

	Ft.	In.
1. Slate, black		
2. Coal , soft	4	5
3. Slate, pavement		

A sample (No. 376R) was collected from No. 2 of section, the composition of which is published under **Mine No. 1182** in the Survey Table of Coal Analyses at the end of this Chapter.

Levi Lilly Farm Mine—No. 1183 on Map II.

In Greenbrier County, on north side of McMillion Creek, 4.6 miles S. 80° E. of Leivasy; **Sewell Coal**; elevation, 3155' B.

	Ft.	In.
Slate, dark		
Coal , soft, columnar.....	2	6
Shale, gray, with plant roots.....		

Marshall Amick Farm Mine—No. 1184 on Map II.

In Greenbrier County, on the head of Pack Fork of Laurel Creek, 3.9 miles S. 69° E. of Leivasy; **Sewell Coal**; elevation, 3070' B.

	Ft.	In.
Shale, sandy	10	0
Coal, soft	2	5
Slate, pavement		

Baltimore & Ohio Railroad Company Prospect—No. 1185 on Map II.

On Taylor Creek, 0.7 mile S. 49° W. of Curtin; **Sewell Coal**; elevation, 1865' B.

	Ft.	In.
Sandstone, cliff, Lower Guyandot	25	0
Coal, thickness concealed.....		
Concealed to creek.....	10	0

Baltimore & Ohio Railroad Company Prospect—No. 1186 on Map II.

On hillside south of Gauley River, 0.9 mile S. 57° W. of Curtin; **Sewell Coal**; elevation, 1855' B.

	Ft.	In.
Sandstone, massive, Lower Guyandot	15	0
Shale, dark, Hartridge	3	0
Coal, soft	1' 1"	
Slate, bony	0 1	
Coal, soft	2 6	
Slate, bony	0 7	
Coal, soft	0 7	4 10
Sandstone, massive	5	0

Baltimore & Ohio Railroad Company Prospect—No. 1187 on Map II.

On hillside south of Gauley River, 1.0 mile S. 54° W. of Curtin; **Sewell Coal**; elevation, 1860' B.

Fallen shut, thickness unknown.

Baltimore & Ohio Railroad Company Prospect—No. 1188 on Map II.

On west side of Panther Creek, 2.3 miles N. 87° W. of Lowland; **Sewell Coal**; elevation, 1890' B.

	Ft.	In.
Fallen shut, coal, reported, 3' 2" to.....	4	0

The following is a small tippic operation, the product of which is mainly used for locomotive fuel:

**Pardee & Curtin Lumber Company Mine—No. 1189 on
Map II.**

On east hillside of Panther Creek, 2.1 miles N. 86° E. of Lowland; **Sewell Coal**; elevation, 1900' B.; section about 500 feet in.

	Ft.	In.
1. Slate, dark		
2. Coal, soft, good, 4' 8" to.....	5	10
3. Slate, pavement		

"Principal office, Curtin, W. Va.; coal owned by Baltimore & Ohio Railroad Company; daily capacity, 25 to 30 tons; 4 men employed; mule haulage; greatest rise, southeast; coal used for steam fuel on Pardee & Curtin Lumber Company Railroad; A. W. Smith, authority for mine data; sample (No. 372R) collected from No. 2 of section, about 500 feet up entry, for composition of which see **Mine No. 1189** in the Survey Table of Coal Analyses at the end of this Chapter."

**Baltimore & Ohio Railroad Company Prospect—No. 1190 on
Map II.**

On west side of Panther Creek, 1.7 miles north of Lowland; **Sewell Coal**; elevation, 1925' B.

	Ft.	In.
Sandstone, massive, Lower Guyandot	25	0
Shale, dark, Hartridge	3	0
Coal, thickness concealed.....		

**Baltimore & Ohio Railroad Company Prospect—No. 1191 on
Map II.**

On east side of Panther Creek, 0.5 mile N. 35° E. of Lowland; **Sewell Coal**; elevation, 2145' B.

	Ft.	In.
Sandstone, cliff	15	0
Coal, prospect, none found (?).....		
Shale, sandy, to creek.....	10	0

The following is a small tippic operation, the output of which is used largely for locomotive fuel:

**Pardee & Curtin Lumber Company Mine—No. 1192 on
Map II.**

On south side of Gauley River, 2.8 miles S. 69° W. of Curtin;
Sewell Coal; elevation, 1805' B.; section at mine mouth.

	Ft.	In.
Sandstone, massive, Lower Guyandot	30	0
Shale, dark, Hartridge	8	0
Coal, soft	4	8"
Coal, bony	0	9
Coal, soft	1	3
	6	8

Section in main entry:

1 Shale, hard, sandy		
2. Coal, soft, clean.....	3	10"
3. Coal, slightly bony, sometimes all soft and good.....	0	5
4. Coal, soft.....	0	6
	4	9
5. Sandstone, pavement		

"Principal office, Curtin, W. Va.; coal owned by Baltimore & Ohio Railroad Company; daily capacity, 30 tons; 5 men employed; mule haulage; greatest rise, southeast; coal used mainly for railroad fuel; sample (No. 359R) collected from Nos. 2 and 5 of section, for composition of which see Mine No. 1192 in the Survey Table of Coal Analyses at the end of this Chapter."

**Baltimore & Ohio Railroad Company Exposure—No. 1193 on
Map II.**

On south side of Gauley River, 2.9 miles S. 70° W. of Curtin;
Sewell Coal; elevation, 1785' B.

	Ft.	In.
Sandstone, massive		
Shale, dark, Hartridge	10	0
Coal, soft	2	0"
Coal, harder	1	2
Coal, soft	2	4
Slate, bony	2	8
Coal, soft	0	8
	8	10
Slate	10	0

**Baltimore & Ohio Railroad Company Prospect—No. 1194 on
Map II.**

On south side of Gauley River, 3.1 miles S. 74° W. of Curtin;
Sewell Coal; elevation, 1750' B.

	Ft.	In.
Shale, sandy		
Coal, soft	4	10
Slate, bony, and concealed, to Gauley River.....	2	0

Baltimore & Ohio Railroad Company Prospect—No. 1195 on Map II.

On south side of Gauley River, 3.2 miles S. 75° W. of Curtin;
Sewell Coal; elevation, 1750' B.

	Ft.	In.
Slate, dark		
Coal, soft	2	0"
Coal, harder	0	8
Coal, soft	2	5
	<hr style="width: 50px; margin-left: auto; margin-right: 0;"/>	
Slate, bony, and concealed, to Gauley River.....	5	0

Coal Blossom—No. 1196 on Map II.

On road east of Hominy Creek, 1.6 miles N. 34° E. of Bruce;
Sewell Coal; elevation, 2065' B.; for stratigraphic position see Orndorff
Bridge Section, page 172.

Coal blossom, thickness unknown.

Coal Blossom—No. 1197 on Map II.

On timber railroad, east of Hominy Creek, 1.0 mile N. 51° W. of
Hominy Mill; Sewell Coal; elevation, 2245' B.

	Ft.	In.
Coal blossom, in cut, visible, 2' 0" to.....	3	0

Gauley Coal Land Company Prospect—No. 1198 on Map II.

On south side of Grassy Creek, 0.2 mile south of Hominy Mill;
Sewell Coal; elevation, 2260' B.

	Ft.	In.
Slate, dark		
Coal, soft	1	8"
Slate, dark	3	0
Coal, estimated	2	0
	<hr style="width: 50px; margin-left: auto; margin-right: 0;"/>	
Slate, pavement	6	8

Tidewater Coal Company Prospect—No. 1199 on Map II.

On north side of Grassy Creek, 0.3 mile west of Grassy Falls;
Sewell Coal; elevation, 2250' B.

Fallen shut, thickness unknown.

H. B. Davis Farm Mine—No. 1200 on Map II.

On south side of Grassy Creek, 0.2 mile S. 15° W. of Grassy Falls; Sewell Coal; elevation, 2275' B.

	Ft.	In.
Sandstone, massive, Lower Guyandot.....		
Shale, dark, Hartridge.....	15	0
Coal, soft	1	1"
Slate, dark	0	9
Coal, soft	1	7
	<hr style="width: 50px; margin-left: auto; margin-right: 0;"/>	
Slate, pavement	3	5

At the following mine, where operations have now ceased, the coal was formerly mined from a shallow shaft, the product having been elevated to the surface by an ingenious water-wheel device, deriving its power from the Grassy Creek Falls just above the shaft. At the time of the writer's visit the shaft was full of water, the section being reported as follows by P. K. Dotson, the owner.

P. K. Dotson Shaft Mine—No. 1201 on Map II.

On Grassy Creek, at Grassy Falls; Sewell Coal; elevation, 2260' B.

	Ft.	In.
Sandstone and shale.....	31	0
Coal, with 0' 6" to 0' 8" parting.....	4	0

Gauley Coal Land Company Prospect (Daniel O'Dell Opening)—No. 1202 on Map II.

Near the head of Line Laurel Creek, 2.7 miles S. 68° E. of Leivasy; Sewell Coal; elevation, 2740' B.

	Ft.	In.
1. Slate, dark		
2. Coal, soft	1	1"
3. Slate, dark-gray.....	1	6
4. Coal, soft	2	6
	<hr style="width: 50px; margin-left: auto; margin-right: 0;"/>	
5. Slate, pavement	5	1

A sample (No. 367R) was collected from No. 4 of section, the composition of which is published under **Mine No. 1202** in the Survey Table of Coal Analyses at the end of this Chapter.

Gauley Coal Land Company Prospect (Sanford McCutcheon Opening)—No. 1203 on Map II.

Near the head of Line Laurel Creek, 3.0 miles S. 65° E. of Leivasy; Sewell Coal; elevation, 2785' B.

	Ft.	In.
Slate, dark		
Coal, soft	1'	3"
Shale, dark	0	10
Coal, soft	2	4
	4	5
Slate, pavement		

Marietta Perkins Farm Mine—No. 1204 on Map II.

On east side of Brushy Meadow Creek, 0.7 mile S. 60° E. of Leivasy; Sewell Coal; elevation, 2355' B.

	Ft.	In.
Slate		
Coal, soft	1'	2"
Shale, dark	0	5
Coal, soft	1	9
	3	4
Slate, pavement		

Tidewater Coal Company Prospect (Homer Ramsbarger Opening)—No. 1205 on Map II.

On a branch of Brushy Meadow Creek, 0.7 mile S. 60° E. of Leivasy; Sewell Coal; elevation, 2350' B.

	Ft.	In.
Slate, dark		
Coal, soft	1'	0"
Slate, dark	0	4
Coal, soft	2	4
	3	8
Slate, pavement		

Tidewater Coal Company Prospect (Homer Ramsbarger Opening)—No. 1206 on Map II.

On a branch of Brushy Meadow Creek, 0.9 mile S. 70° E. of Leivasy; Sewell Coal; elevation, 2360' B.

Fallen shut, thickness unknown.

Edwin Losh Farm Mine—No. 1207 on Map II.

On a branch of Brushy Meadow Creek, 1.2 miles S. 73° E. of Leivasy; Sewell Coal; elevation, 2375' B.

	Ft.	In.
Shale, dark, Hartridge.....	5	0
Coal, soft	1'	0"
Slate, bony	0	4
Coal, soft	2	4
	<hr style="width: 50px; margin-left: auto; margin-right: 0;"/>	3
Slate, pavement		8

Tidewater Coal Company Farm Mine (Tony Jones Opening)—No. 1208 on Map II.

On a branch of Brushy Meadow Creek, 1.5 miles S. 74° E. of Leivasy; Sewell Coal; elevation, 2410' B.

	Ft.	In.
1. Slate, dark	5	0
2. Coal, soft	3	6
3. Slate, pavement		

A sample (No. 365R) was collected from No. 2 of section, the composition of which is published under Mine No. 1208 in the Survey Table of Coal Analyses at the end of this Chapter.

Gauley Coal Land Company Prospect (King Richard Opening)—No. 1209 on Map II.

On west side of Brushy Meadow Creek, 0.9 mile north of Carl; Sewell Coal; elevation, 2555' B.

	Ft.	In.
Slate, dark		
Coal, soft	3	8
Slate, pavement		

Lee McClung Farm Mine—No. 1210 on Map II.

On a branch of Brushy Meadow Creek, 1.1 miles northeast of Carl; Sewell Coal; elevation, 2590' B.

	Ft.	In.
Slate, dark		
Coal, soft, columnar.....	2	9
Shale, gray, pavement.....		

Peter W. Pitsenberger Farm Mine—No. 1211 on Map II.

On west side of Brushy Meadow Creek, 0.5 mile northeast of Carl;
Sewell Coal; elevation, 2625' B.

	Ft.	In.
Slate, dark	3	0
Coal, soft	5	0
Slate, pavement.....		

Tidewater Coal Company Prospect (Wilson McClung Opening)—No. 1212 on Map II.

On west side of Brushy Meadow Creek, 0.4 mile northeast of Carl;
Sewell Coal; elevation, 2635' B.

	Ft.	In.
Slate, dark		
Coal, soft	5	0
Slate, pavement		

Tidewater Coal Company Prospect (Sanford McCutcheon Opening)—No. 1213 on Map II.

On east side of Brushy Meadow Creek, 0.6 mile northeast of Carl;
Sewell Coal; elevation, 2770' B.; for stratigraphic position see White
 Buck Knob Section, page 173.

	Ft.	In.
Fallen shut, coal, clean, reported.....	3	0

Tidewater Coal Company Farm Mine (Henry Amick Opening)—No. 1214 on Map II.

On a short branch of Brushy Meadow Creek, 0.5 mile southeast of
 Carl; **Sewell Coal**; elevation, 2815' B.

	Ft.	In.
Slate, dark		
Coal, soft, columnar.....	4	0
Slate, pavement		

A sample (No. 364R) was collected from No. 2 of section,
 the composition of which is published under **Mine No. 1214** in
 the Survey Table of Coal Analyses at the end of this Chapter.

Gauley Coal Land Company Farm Mine (Francis Trout Opening)—No. 1215 on Map II.

On hillside west of Brushy Meadow Creek, 0.7 mile southeast of
 Carl; **Sewell Coal**; elevation, 2870' B.

	Ft.	In.
Mine half full of water, coal, reported.....	4	0

Samuel O'Dell Farm Mine—No. 1216 on Map II.

On hillside west of Brushy Meadow Creek, 0.8 mile southeast of Carl; Sewell Coal; elevation, 2905' B.

	Ft.	In.
Slate, dark		
Coal, soft	3	10
Slate, pavement		

Perry Amick Farm Mine—No. 1217 on Map II.

In edge of Greenbrier County, 1.4 miles southeast of Carl; Sewell Coal; elevation, 3120' B.

	Ft.	In.
Slate, dark		
Coal	3	2
Slate, pavement		

Boardman White Farm Mine—No. 1218 on Map II.

On a branch of Brushy Meadow Creek, 0.5 mile south of Leivasy; Sewell Coal; elevation, 2370' B.

	Ft.	In.
Slate, dark		
Coal, cannel	1	2"
Coal, soft	0	10
Slate, dark	1	6
Coal, soft	2	1
	5	7
Slate, pavement		

Ward Murphy Farm Mine—No. 1219 on Map II.

On a branch of Brushy Meadow Creek, 0.6 mile south of Leivasy; Sewell Coal; elevation, 2385' B.

	Ft.	In.
Slate, dark		
Coal, cannel	0	11"
Coal, soft	0	10
Slate, dark	1	6
Coal, soft	2	0
	5	3
Slate, pavement		

Wm. Amick Farm Mine—No. 1220 on Map II.

On a branch of Brushy Meadow Creek, 0.9 mile south of Leivasy; Sewell Coal; elevation, 2375' B.

	Ft.	In.
1. Slate, dark		
2. Coal, cannel bone.....0' 5"		
3. Coal, soft	1	4
4. Slate, dark	1	7
5. Coal, soft	2	4
	5	8
6. Slate, pavement		

A sample (No. 363R) was collected from Nos. 3 and 5 of section, the composition of which is published under **Mine No. 1220** in the Survey Table of Coal Analyses at the end of this Chapter.

Gauley Coal Land Company Prospect—No. 1221 on Map II.

On a branch of Brushy Meadow Creek, 0.6 mile northwest of Carl;
Sewell Coal; elevation, 2545' B.
 Fallen shut, thickness unknown.

Gauley Coal Land Company Prospect—No. 1222 on Map II.

On the head of Roaring Creek, 1.7 miles S. 60° E. of Hominy Falls;
Sewell Coal; elevation, 2460' B.
 Fallen shut, thickness unknown.

Coal Blossom--No. 1223 on Map II.

On hillside east of Hominy Creek, 1.9 miles S. 18° E. of Hominy Falls; **Sewell Coal**; elevation, 2485' B.; for stratigraphic position see Coggins Knob Section, page 173.

	Ft.	In.
Coal blossom, heavy, reported.....	7	0

Marvin McClung Farm Mine—No. 1224 on Map II.

On east side of Hominy Creek, 2.2 miles S. 16° E. of Hominy Falls;
Sewell Coal; elevation, 2500' B.

	Ft.	In.
1. Slate, black		
2. Coal, soft, columnar.....2' 8"		
3. Slate, bony	3	3
4. Coal, soft	1	0
	6	11
5. Slate, pavement.....		

A sample (No. 350R) was collected from No. 2 of section, the composition of which is published under **Mine No. 1224** in the Survey Table of Coal Analyses at the end of this Chapter.

Gauley Coal Land Company Prospect—No. 1225 on Map II.

On hillside east of Hominy Creek, 0.3 mile east of Bamboo; **Sewell Coal**; elevation, 2585' B.
Fallen shut, thickness unknown.

Gauley Coal Land Company Prospect (Hugh Siers Opening)—No. 1226 on Map II.

On a branch of Hominy Creek, 1.5 miles east of Bamboo; **Sewell Coal**; elevation, 2610' B.
Fallen shut, thickness unknown.

Gauley Coal Land Company Prospect (Bird Siers Opening)—No. 1227 on Map II.

On a branch of Hominy Creek, 1.6 miles east of Bamboo; **Sewell Coal**; elevation, 2650' B.

	Ft.	In.
Slate, dark		
Coal, soft	0'	11"
Slate, dark	1	0
Coal, soft, columnar.....	3	6
	5	5
Slate, pavement		

Gauley Coal Land Company Prospect (Emmett Orndorff Opening)—No. 1228 on Map II.

On a branch of Hominy Creek, 1.8 miles N. 83° E. of Bamboo; **Sewell Coal**; elevation, 2680' B.

	Ft.	In.
Shale, dark	5	0
Coal	0'	8"
Slate, dark	0	4
Coal, soft	2	3
	3	3
Slate, pavement		

Gauley Coal Land Company Prospect—No. 1229 on Map II.

On a branch of Hominy Creek, 1.7 miles N. 80° E. of Bamboo; **Sewell Coal**; elevation, 2670' B.

		Ft.	In.
1. Shale, dark.....		3	0
2. Coal, soft.....	0' 3½"		
3. Slate, dark.....	0 5		
4. Coal, soft.....	2 3½	3	5
5. Slate, pavement, and concealed to branch.....	10		0

A sample (No. 353R) was collected from Nos. 2 and 4 of section, the composition of which is published under **Mine No. 1229** in the Survey Table of Coal Analyses at the end of this Chapter.

Sewell (Sharon?) Coal, Wilderness District.

In Wilderness District the Sewell Coal outcrops on the upper waters of Hominy and Anglins Creeks and is just above drainage on Meadow River at the southwest corner of the County. The following openings and prospects were noted:

Gauley Coal Land Company Prospect (Thomas Orndorff Opening)—No. 1230 on Map II.

On a short branch of Hominy Creek, 1.3 miles west of Hominy Mill; **Sewell Coal**; elevation, 2275' B.

		Ft.	In.
1. Sandstone, massive.....			
2. Coal, soft, good.....	1' 6"		
3. Coal, bony and slaty.....	1 6	3	0
4. Slate, pavement.....			

A sample (No. 348R) was collected from No. 2 of section, the composition of which is published under **Mine No. 1230** in the Survey Table of Coal Analyses at the end of this Chapter.

The following is a small tippie opening, having an output of 225 bushels daily, the product being used for railroad fuel:

Pardee & Curtin Lumber Company Mine—No. 1231 on Map II.

On west side of Hominy Creek, 0.5 mile N. 52° W. of Hominy Mill; **Sewell Coal**; elevation, 2235' B.

		Ft.	In.
1. Slate, dark.....			
2. Coal, soft, good.....		2	4
3. Slate, bony, about half coal.....		3	6
4. Slate, pavement.....			

A sample (No. 354R) was collected from No. 2 of section, the composition of which is published under Mine No. 1231 in the Survey Table of Coal Analyses at the end of this Chapter.

Pardee & Curtin Lumber Company Mine (Abandoned)—No. 1232 on Map II.

On west side of Hominy Creek, 0.6 mile S. 39° W. of Hominy Mill; **Sewell Coal**; elevation not obtained.

	Ft.	In.
Fallen shut, reported by J. N. Fleger, 3' 6" to.....	3	8

Frank O'Dell Farm Mine—No. 1233 on Map II.

On west side of Hominy Creek, 0.8 mile N. 29° E. of Hominy Falls; **Sewell Coal**; elevation, 2300' B.

	Ft.	In.
Sandstone, cliff, Guyandot and Lower Guyandot.....	110	0
Shale, dark, Hartridge.....	8	0
Coal, soft	2'	3"
Coal, bony	0	9
	<hr style="width: 10%; margin: 0 auto;"/>	3
		0

Slate, pavement

Gauley Coal Land Company Prospect—No. 1234 on Map II.

On west side of Hominy Creek, 1.3 miles S. 10° W. of Hominy Falls; **Sewell Coal**; elevation, 2387' B.

	Ft.	In.
Shale, dark		
Coal, soft, good.....	1'	5"
Coal, bony	0	6
Slate, bony	0	10
Coal, soft	0	3
	<hr style="width: 10%; margin: 0 auto;"/>	3
		0

Slate, pavement

Granville O'Dell Farm Mine—No. 1235 on Map II.

On a short branch of Hominy Creek, 1.5 miles S. 25° W. of Hominy Falls; **Sewell Coal**; elevation, 2420' L.; for stratigraphic position see Hominy Falls Section, page 175.

	Ft.	In.
1. Slate, dark		
2. Coal, soft	2'	4"
3. Slate, bony	0	7
4. Coal, bony	1	6
5. Coal, soft, good.....	0	8
	<hr style="width: 10%; margin: 0 auto;"/>	5
		1

6. Slate, pavement

A sample (No. 349R) was collected from Nos. 2 and 5 of section, the composition of which is published under **Mine No. 1235** in the Survey Table of Coal Analyses at the end of this Chapter.

The above opening, which is operated by Frank Beam, supplies most of the local fuel for Hominy Falls, its output being about 300 bushels daily, and 4 miners being employed.

Gauley Coal Land Company Prospect—No. 1236 on Map II.

On west side of Hominy Creek, 0.8 mile S. 38° E. of Bamboo; **Sewell Coal**; elevation, 2600' B.

Fallen shut, thickness unknown.

Gauley Coal Land Company Prospect—No. 1237 on Map II.

On west side of Prices Fork of Hominy Creek, 1.0 mile S. 8° E. of Bamboo; **Sewell Coal**; elevation, 2620' B.

	Ft.	In.
1. Slate, dark		
2. Coal, soft	2	6
3. Slate, bony, bottom not exposed.....		

A sample (No. 351R) was collected from No. 2 of section, the composition of which is published under **Mine No. 1237** in the Survey Table of Coal Analyses at the end of this Chapter.

Lemuel Hellems Farm Mine—No. 1238 on Map II.

In Greenbrier County, on Peasers Fork of Hominy Creek, 1.9 miles S. 19° E. of Bamboo; **Sewell Coal**; elevation, 2725' B.

	Ft.	In.
Shale, dark		
Coal, soft	3'	6"
Shale, dark	0	6
Coal, bony	0	5
Coal, soft	1	4
	5	9

Fire clay, pavement

Lemuel Hellems Farm Mine—No. 1239 on Map II.

In Greenbrier County, on Peasers Fork of Hominy Creek, 2.1 miles S. 20° E. of Bamboo; **Sewell Coal**; elevation, 2770' B.

		Ft.	In.
1. Slate, dark			
2. Coal, soft	4' 7"		
3. Slate, dark	0 6		
4. Coal, soft	1 4	6	5
5. Shale, pavement			

A sample (No. 352R) was collected from Nos. 2 and 4 of section, the composition of which is published under **Mine No. 1239** in the Survey Table of Coal Analyses at the end of this Chapter.

Gauley Coal Land Company Farm Mine (Joseph Amick Opening)—No. 1240 on Map II.

On west side of Anglins Creek, 2.1 miles S. 70° W. of Snow Hill; **Sewell Coal**; elevation, 2310' B.; for stratigraphic position see Anglins Creek Section, page 178.

		Ft.	In.
1. Slate, black, Hartridge		3	0
2. Coal, soft		2	1
3. Sandstone			

A sample (No. 343R) was collected from No. 2 of section, the composition of which is published under **Mine No. 1240** in the Survey Table of Coal Analyses at the end of this Chapter.

Gauley Coal Land Company Prospect (Joseph Amick Opening)—No. 1241 on Map II.

On west side of Anglins Creek, 2.1 miles S. 68° W. of Snow Hill; **Sewell Coal**; elevation, 2310' B.
Fallen shut, thickness unknown.

Marvin Richardson Farm Mine — No. 1242 on Map II.

On a short branch of Anglins Creek, 2.2 miles N. 34° E. of Nutterville; **Sewell Coal**; elevation, 2440' B.

		Ft.	In.
1. Shale, dark, Hartridge		10	0
2. Coal, soft	3' 5"		
3. Coal, slaty	0 4	3	9
4. Slate, pavement			

A sample (No. 344R) was collected from No. 2 of section, the composition of which is published under **Mine No. 1242** in

the Survey Table of Coal Analyses at the end of this Chapter. The unusually high ash content is probably due to the fact that the mine entry had not been driven far enough underground to secure clean coal.

Johnson Nutter Farm Mine—No. 1243 on Map II.

In Greenbrier County, on a branch of Anglins Creek, 1.8 miles S. 87° E. of Nutterville; Sewell Coal; elevation, 2705' B.

	Ft.	In.
Fallen shut, coal, reported, 1' 7" to.....	1	9

Coal Stripping—No. 1244 on Map II.

In an east branch of Meadow River, 0.4 mile northeast of Nallen; Sewell Coal; elevation, 1945' B.

	Ft.	In.
Coal, reported by Jacob Bays.....	1	0

Coal Exposure—No. 1245 on Map II.

On east bank of Meadow River at Nallen; Sewell Coal; elevation, upper bench, 1930' B.; lower bench, 1900' B.; for stratigraphic position and details see Nallen Section, page 179.

The following is a small tittle mine located in Fayette County, just across Meadow River from Nicholas, the output being mainly used for railroad fuel on logging locomotives:

Wilderness Lumber Company Mine—No. 1246 on Map II.

In Nuttall District, Fayette County, west side of Meadow River at Nallen; Sewell Coal; elevation, 1925' B.; observation by Ray V. Hennen (see Fayette Report, pages 703-704).

	Ft.	In.
1. Shale, buff, sandy, roof.....		
2. Coal, soft, columnar.....	2'	0"
3. Coal and slate, mixed.....	0	6
	6	
4. Slate, pavement		

A sample (No. 915H) was collected at the face by Mr. Hennen, the composition of which is published under Mine No. 1246 in the Survey Table of Coal Analyses at the end of this Chapter.

Quantity of Sewell (Sharon?) Coal Available.

The following table, compiled by Tucker from a planimetric measurement of the outcrop on Map II, and as limited on the north by Figure 20, shows the probable amount of Sewell Coal in the County. In the districts lying north of Gauley a low average thickness is purposely assumed to allow for the patchy nature of the seam :

Probable Amount of Sewell (Sharon?) Coal.

District	Thickness of Coal Assumed Feet	Square Miles	Acres	Cubic Feet of Coal	Short Tons of Coal.
Jefferson	1	20.30	12,992	565,931,520	22,637,261
Grant	1	26.10	16,704	727,626,240	29,105,050
Summersville	1	37.70	24,128	1,051,015,680	42,040,627
Hamilton	1	38.50	24,640	1,073,318,400	42,932,736
Beaver	2	77.00	49,280	4,293,273,600	171,730,944
Richwood	1	12.15	7,776	338,722,560	13,548,902
Kentucky	3	108.40	69,376	9,066,055,680	362,642,227
Wilderness	3	83.20	53,248	6,958,448,640	278,337,946
Totals .....	.....	403.35	258,144	24,074,392,320	962,975,693

FIRE CREEK COAL.

The Fire Creek Coal, previously discussed in Chapter VII, pages 345-6, outcrops only in the Cranberry and Cherry River drainage basins, in some portions of which it has minable thickness and in certain localities on Hominy and Anglins Creeks. Its extent as a minable seam appears to be limited to a somewhat narrow belt, passing westward across the southern end of the county toward Fayette, where it is known to be present in considerable quantity. It does not seem probable that this seam underlies the central and northern portions of the county in merchantable quantity. In the region of its outcrop it is a double- or multiple-bedded seam, 2 to 5 feet in thickness, usually having a considerable slate or bony parting near the middle. In quality the coal is soft and columnar in its structure, being low in volatile matter, low in

Fire Creek Coal, Beaver District.

In Beaver District the Fire Creek Coal outcrops on Cranberry and Cherry Rivers, the following openings and exposures having been noted:

Cherry River Boom & Lumber Company Exposure—No. 1265 on Map II.

On south side of Cranberry River, 1.4 miles southeast of Cranberry Station; **Fire Creek Coal**; elevation, 2015' B.

	Ft.	In.
Sandstone, massive, coarse.....		
Slate, black, at sulphur spring.....		
Concealed and sandy shale.....	10	0
Sandstone, shaly	5	0
Shale, gray	3	0
Coal, soft	1	0
Fire clay shale.....	2	0
Sandstone, massive, in river.....	13	0

Cherry River Boom & Lumber Company Prospect—No. 1266 on Map II.

On north side of Cranberry River, 1.9 miles southeast of Cranberry Station; **Fire Creek Coal**; elevation, 2145' B.

Fallen shut, thickness unknown.

Cherry River Boom & Lumber Company Prospect—No. 1267 on Map II.

On south side of Cranberry River, 2 miles southeast of Cranberry Station; **Fire Creek Coal**; elevation, 2140' B.

	Ft.	In.
Slate, black	3	0
Coal, bony cannel.....	1'	0"
Coal, soft, columnar.....	2	5
Coal, bony	0	4
	<hr style="width: 100px; margin-left: auto; margin-right: 0;"/>	3
Slate, pavement		9

Cherry River Boom & Lumber Company (Camden-McGraw Tract) Prospect—No. 1267A on Map II.

In Glade District, Webster County, 0.4 mile eastward from Bee Run and 0.2 mile from Nicholas Line; **Fire Creek Coal**; elevation, 2275' B.

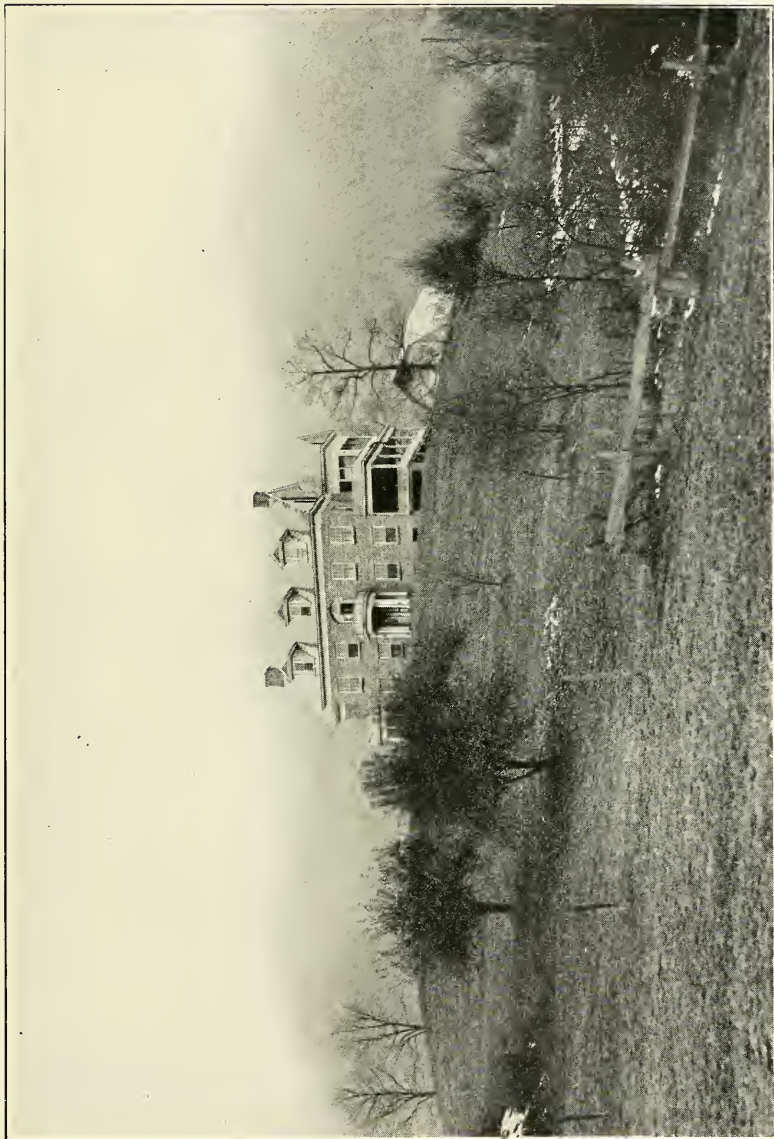


PLATE XXXI. — Residence of Alex. N. Breckenridge at Summersville, built of Monitor Sandstone. Photo by E. E. Harris.

	Ft.	In.
1. Sandstone, massive		
2. Coal, soft	1	10
3. Slate and concealed to river	15	0

A sample (No. 209R) was collected from No. 2 of section, the composition of which is published under **Mine No. 1267A** in the Survey Table of Coal Analyses at the end of this Chapter.

Coal Exposure—No. 1268 on Map II.

On north side of Cherry River, 0.5 mile S. 50° E. of Fenwick; **Fire Creek Coal**; elevation, 2155' B.; section in railroad cut.

	Ft.	In.
Sandstone, massive	8	0
Shale, sandy	10	0
Coal blossom		
Concealed and shale, sandy, to grade.....	20	0

Craig-Deitz Coal Company Mine—No. 1269 on Map II.

On road, north bank of Cherry River, 0.1 mile west of Dain; **Fire Creek Coal**; elevation, 2200' B.

	Ft.	In.
1. Slate, black		
2. Coal, soft	1'	0"
3. Slate, bony	1	0
4. Coal, soft	1	0
	3	0
5. Slate, pavement	2	0
6. Sandstone, massive	7	0

A sample (No. 377R) was collected from Nos. 2 and 4 of section, the composition of which is published under **Mine No. 1269** in the Survey Table of Coal Analyses at the end of this Chapter. At the time of the writer's visit to the above opening, the Company was planning to install a small tippie to furnish custom coal to Richwood and vicinity.

Fire Creek Coal, Richwood District.

In Richwood District the Fire Creek Coal outcrops along Cherry River in the vicinity of Richwood and eastward to the Greenbrier County Line, having been opened at several points for local use. Farther east, in the edge of Webster County, it has been opened on Dogway Fork of Cranberry River where an opportunity is afforded to determine its thickness and character. The following prospects and exposures were noted:

Coal Prospect—No. 1270 on Map II.

On south side of Cherry River, at south end of Richwood; **Fire Creek Coal**; elevation, 2325' B.

	Ft.	In.
Fallen shut, coal, reported.....	1	8

Coal Blossom—No. 1271 on Map II.

On Cherry River, at north edge of Richwood; **Fire Creek Coal**; elevation, 2300' B.

Coal blossom, thickness unknown.

N. B. McCarty Heirs Prospect—No. 1272 on Map II.

On west hillside of South Fork of Cherry River, at southeast edge of Richwood; **Fire Creek Coal**; elevation, 2400' B.

	Ft.	In.
Fallen shut, coal, reported.....	2	6

Cherry River Boom & Lumber Company (Camden-McGraw Tract) Prospect—No. 1273 on Map II.

In Webster County, on west side of Dogway Fork of Cranberry River, 0.5 mile north of Dogway; **Fire Creek Coal**; elevation, 3060' B.

	Ft.	In.
1. Shale, dark, sandy.....	20	0
2. Coal	2'	0"
3. Slate, dark	1	0
4. Coal	1	6
5. Slate, pavement		

A sample (No. 210R) was collected from Nos. 2 and 4 of section, the composition of which is published under **Mine No. 1273** in the Survey Table of Coal Analyses at the end of this Chapter.

Cherry River Boom & Lumber Company (Camden-McGraw Tract) Prospect—No. 1273A on Map II.

In Webster County, on west side of Dogway Fork of Cranberry River, 0.8 mile northward from Dogway village; **Fire Creek Coal**; elevation, 3065' B.

Fallen shut, thickness unknown.

Cherry River Boom & Lumber Company (Camden-McGraw Tract) Prospect—No. 1274 on Map II.

In Webster County, on east side of Dogway Fork of Cranberry River, 0.3 mile north of Dogway; **Fire Creek Coal**; elevation, 3085' B. Fallen shut, thickness unknown.

Fire Creek Coal, Kentucky District.

In Kentucky District the Fire Creek Coal outcrops on the waters of Cherry River above Holcomb, and in a restricted area on Hominy Creek below Hominy Mill, the following openings and exposures having been noted:

Craig-Deitz Coal Company Prospect—No. 1275 on Map II.

On west side of Cherry River, 1.1 miles N. 38° W. of Fenwick; **Fire Creek Coal**; elevation, 2075' B.

	Ft.	In.
Slate, black	5	0
Coal, slaty	1'	0"
Shale, gray	0	7
Coal	0	6
	2	1
Shale, gray, pavement.....		

Laurel Manufacturing Company Farm Mine—No. 1276 on Map II.

In Greenbrier County, on south side of McMillion Creek, 4.5 miles S. 4° W. of Saxman; **Fire Creek Coal**; elevation, 3000' B.

	Ft.	In.
Slate, black		
Coal, bony	0'	11"
Slate, bony	0	4
Coal, soft	2	0
	3	3
Slate, pavement		

Coal Blossom—No. 1277 on Map II.

On road, on south side of Hominy Creek, 1.4 miles N. 76° W. of Hominy Mill; **Fire Creek Coal**; elevation, 2110' B. Coal blossom, thickness unknown.

Fire Creek Coal, Wilderness District.

In Wilderness District the Fire Creek Coal outcrops only in a restricted area on Hominy Creek below Hominy Mill and on the upper waters of Anglins Creek, the following exposures and prospects having been noted:

Coal Exposure—No. 1278 on Map II.

On east bank of Anglins Creek, 2.7 miles N. 56° E. of Nutterville; **Fire Creek Coal**; elevation, 2330' B.

	Ft.	In.
Sandstone, massive		
Coal, reported, thickness unknown.....		

Gauley Coal Land Company Prospect—No. 1279.

In Meadow Bluff District, Greenbrier County, on north side of Burdette Creek, 2 miles southeast of Nutterville; **Fire Creek Coal**; elevation, 2330' B.; observation by Ray V. Hennen (see Fayette Report, page 820).

	Ft.	In.
Coal, reported by H. W. Osborne.....	1	6

"Sulphur spring here. This coal belongs immediately on top of a grayish-white, quartzitic sandstone (Pineville?) cliff, 30 to 50 feet thick."

Gauley Coal Land Company Prospect—No. 1280.

In Meadow Bluff District, Greenbrier County, 2.1 miles southeast of Nutterville; **Fire Creek Coal**; elevation, 2340' B.; observation by Ray V. Hennen (see Fayette Report, page 820).

	Ft.	In.
Fallen shut, coal, reported by H. W. Osborne.....	1	8

Quantity of Fire Creek Coal Available.

The following table, compiled by Tucker from a planimetric measurement of the outcrop, as limited by Figure 21, shows the probable amount of Fire Creek Coal in the County:

Probable Amount of Fire Creek Coal.

District	Thickness of Coal Assumed Feet	Square Miles	Acres	Cubic Feet of Coal	Short Tons of Coal
Beaver	2	24.60	15,744	1,371,617,280	54,864,691
Richwood	2	15.35	9,824	855,866,880	34,234,675
Kentucky	2	53.20	34,048	2,966,261,760	118,650,471
Wilderness	2	21.35	13,664	1,190,407,680	47,616,307
Totals		114.50	73,280	6,384,153,600	255,366,144

SUMMARY OF AVAILABLE COAL.

For convenience of reference all the mines and prospects described in this Report have been given serial numbers which are printed in blue on Map II, along with the conventional mine symbols. Disregarding those that are applied to thin coals that have no commercial significance, the following table, compiled by Mr. Tucker, gives a list of these numbers that refer to the 17 commercial seams described in the present Chapter, as well as a summary of the total amount of coal that each seam is estimated to contain:

The above table represents the amount of coal believed to be available in the territory of this Report. Only a few thousand tons have already been mined, making an amount that is entirely negligible compared to the sum total as given in the present estimate. Allowing for a total recovery of 80 per cent., the total coal that may eventually be mined is, in round numbers, 4,938,246,000 short tons.

MINABLE COALS BY MAGISTERIAL DISTRICTS.

The minable coals of Nicholas have been discussed by magisterial districts on previous pages of this Chapter. In the Index, at the end of this Report, will be found a list of page references making this information readily available without further discussion.

GEOLOGICAL SURVEY TABLE OF COAL ANALYSES.

The following table, compiled by Tucker, containing the proximate analyses of 151 mines and prospects, together with the ultimate analyses, calorific determinations and fuel ratios of many of them, is the exclusive work of members of the Survey Staff. All the samples were taken by members of the force in the field, being mainly collected in small bags with as much care as was practicable when depending on the scanty saddle-bag equipment such as could be carried in a region as rough as the one under discussion. The samples at commercial mines, however, were taken with standard equipment, the coal being hermetically sealed in tin cans at the mine face.

The chemical work was done by J. B. Krak, Assistant Chemist, working under the direction and with the assistance of B. H. Hite, Chief Chemist, in the Laboratory of the Survey at Morgantown.

In addition to the analyses given in the table numerous others are presented on the preceding pages of this Chapter along with the descriptions of the mines from which they were taken, some of which were made by the chemists of the Survey from samples submitted by the mine owners, while others

represent samples that were taken and analyzed by mining companies or other commercial testing organizations. Many of these are doubtless quite as accurate as those to be found in the Survey Table but it is best to present them separately. In addition to these scattered and miscellaneous tests the chemical work done by a commercial agency for the Tioga Lumber Company has been compiled in a separate table, published with explanations on subsequent pages of this Chapter

In the Survey Table below, the numbers in the left-hand column correspond to the numbers given with the descriptions of the mines in the text and with the mine symbols on Map II. All samples were cut from the mining section of the seam unless otherwise described, the usual method being to discard from the samples such slates as would be rejected in ordinary commercial shipment:

Survey Table of Coal Analyses.

No. on Map II	Mine.	Coal Bed.	Condition of Sample	Proximate.				Common to Both		Ultimate.				Calculated B. T. U. for 1 lb. of Coal	Carbon Divided by Oxygen + Ash
				Moisture	Volatile Matter	Fixed Carbon	Phosphorus	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen		
18	Tioga Lumber Company	Lower Kittanning	A.R.	1.04	34.60	51.04	0.018	10.32	0.80	.....	.....	.....	.....	.....	.....
21	J. D. Acre	Upper Kittanning	A.R.	1.30	41.03	51.41	0.007	6.26	1.81	.....	.....	.....	.....	.....	.....
28	Martin V. Dodrill	Upper Kittanning	A.R.	0.63	36.25	47.45	0.013	15.07	1.31	68.58	5.17	8.09	1.18	12,650	12,610
31	Tioga Lumber Company	Upper Kittanning	A.R.	1.17	36.04	50.76	0.008	11.43	0.95	73.48	5.13	7.89	1.12	13,170	13,300
36	L. H. Corran	Upper Kittanning	A.R.	1.17	35.02	53.75	0.012	10.06	0.55	74.34	4.80	9.09	1.16	13,350	13,110
40	Tioga Lumber Company	Upper Kittanning	A.R.	1.02	36.68	51.92	0.026	10.38	0.71	.....	.....	.....	.....	.....	.....
	Average	Upper Kittanning	A.R.	1.06	36.70	51.56	0.014	10.68	1.02	72.13	5.03	8.36	1.15	13,070	13,007
58	Tioga Lumber Co. (Margaret Strang)	Middle Kittanning	A.R.	1.89	35.33	52.19	0.005	10.59	0.88	.....	.....	.....	.....	.....	.....
60	Tioga Lumber Company	Middle Kittanning	A.R.	0.98	34.04	47.98	0.006	17.00	1.32	.....	.....	.....	.....	.....	.....
65	McQueen Brothers	Middle Kittanning	A.R.	0.75	33.68	49.63	0.018	15.94	4.22	68.25	4.59	5.92	1.08	12,450	12,490
79	Tioga Lumber Company	Middle Kittanning	A.R.	1.70	33.80	47.51	0.011	16.99	1.47	67.47	4.61	8.40	1.09	11,970	12,080
	Average	Middle Kittanning	A.R.	1.33	34.21	49.33	0.010	15.13	1.97	67.86	4.60	7.16	1.07	12,210	12,285
92	Melvin Williams	Lower Kittanning	A.R.	1.23	35.36	59.17	0.007	4.24	0.69	.....	.....	.....	.....	.....	.....
94	Lewis Coal & Land Co.	Lower Kittanning	A.R.	1.52	37.58	53.54	0.015	7.36	0.60	.....	.....	.....	.....	.....	.....
99	Logan Grose	Lower Kittanning	A.R.	1.13	32.97	50.27	0.008	15.63	0.77	.....	.....	.....	.....	.....	.....
106	Caroline Workman	Lower Kittanning	A.R.	0.89	37.83	51.48	0.004	9.80	2.97	.....	.....	.....	.....	.....	.....
112	Elk River C. & L. Co. ("Rich Run")	Lower Kittanning, M. S.	A.D.	1.06	34.59	55.87	0.006	8.18	0.65	77.04	5.04	7.57	1.22	13,600	13,770
112	Elk River C. & L. Co. ("Rich Run")	Lower Kittanning, M. S.	A.R.	1.25	34.53	55.76	0.006	8.46	0.65	76.89	5.05	7.74	1.21	13,580	13,750
112	Elk River C. & L. Co. ("Rich Run")	Lower Kittanning, L. B.	A.D.	1.28	33.02	55.23	0.004	9.57	0.59	76.14	5.02	7.44	1.24	13,400	13,630
112	Elk River C. & L. Co. ("Rich Run")	Lower Kittanning, L. B.	A.R.	1.59	33.82	55.05	0.004	9.54	0.59	75.90	5.05	7.69	1.23	13,360	13,590
112	Elk River C. & L. Co. ("Rich Run")	Lower Kittanning, Bot.	A.D.	1.58	36.49	52.31	0.005	9.62	0.77	74.31	4.98	9.16	1.16	13,360	13,250
112	Elk River C. & L. Co. ("Rich Run")	Lower Kittanning, Bot.	A.R.	1.88	36.38	52.15	0.005	9.50	0.77	74.09	5.00	9.40	1.15	13,320	13,180
133	Elk River C. & L. Co.	Lower Kittanning	A.R.	1.34	35.62	52.98	0.011	10.05	0.67	.....	.....	.....	.....	.....	.....
142	J. M. Butcher	Lower Kittanning	A.R.	0.99	37.71	55.25	0.005	6.05	0.69	.....	.....	.....	.....	.....	.....
145	Elk River Coal & Lumber Co.	Lower Kittanning	A.R.	1.29	36.29	53.22	0.009	9.20	0.65	.....	.....	.....	.....	.....	.....
160	Tioga Lumber Company	Lower Kittanning	A.R.	1.61	33.24	54.27	0.006	10.88	0.96	.....	.....	.....	.....	.....	.....
162	Tioga Lumber Co. (John Roberts)	Lower Kittanning	A.R.	0.77	35.29	52.91	0.009	11.03	0.71	.....	.....	.....	.....	.....	.....
165	Tioga Lumber Company	Lower Kittanning	A.R.	0.84	36.70	51.92	0.028	10.54	0.73	74.63	4.97	7.83	1.30	13,580	13,360
166	Tioga Lumber Company	Lower Kittanning	A.R.	0.79	33.78	53.93	0.007	11.50	0.77	.....	.....	.....	.....	.....	.....
179	R. M. Duffy	Lower Kittanning	A.R.	1.03	33.00	51.64	0.004	14.33	0.63	.....	.....	.....	.....	.....	.....
181	McQueen Bros.	Lower Kittanning	A.R.	0.95	34.99	54.96	0.025	9.10	0.95	75.90	5.22	7.59	1.24	13,940	13,750
192	Tioga Lumber Company	Lower Kittanning	A.R.	0.96	36.64	54.41	0.003	7.99	1.10	76.62	5.30	7.71	1.23	14,026	13,900
198	Andrew McCoy	Lower Kittanning	A.R.	1.19	34.16	58.60	0.013	6.05	0.54	.....	.....	.....	.....	.....	.....
	Average	Lower Kittanning	A.R.	1.18	35.33	53.57	0.009	9.52	0.86	75.67	5.10	8.00	1.23	13,626	13,555

Survey Table of Coal Analyses. (Continued).

No. on	Mine.	Coal Bed.	Condition of Sample	Proximate.				Common to Both		Ultimate.				Calorimeter B. T. U.	For 1 lb. of Coal	Calculated B. T. U.	For 1 lb. of Coal	Carbon Divided by Oxygen + Ash
				Moisture	Volatile Matter	Fixed Carbon	Phosphorus	Ash	Subbur	Carbon	Hydrogen	Oxygen	Nitrogen					
229	O. C. Lewis et al.	Clarion.	A.R.	1.20	35.88	64.94	0.004	7.98	1.06	..	..	..	..	..	..	..	..	..
230	Tioga Lumber Company.	Clarion.	A.R.	1.00	35.46	66.38	0.003	7.16	1.02	..	..	..	..	..	..	..	..	..
272	Elk River Coal & Lumber Co.	Clarion.	A.R.	1.10	35.67	65.66	0.0035	7.57	1.04	..	..	..	..	..	..	..	..	..
289	Craig Tract (Thomas Davis).	Stockton.	A.R.	0.87	39.81	48.07	0.006	11.95	4.48	71.69	5.28	6.36	0.94	13,290	13,280	4.07	..	..
	Average.	Stockton.	A.R.	1.18	34.06	65.28	0.005	9.48	0.63	..	..	..	..	..	..	..	..	..
314	Greentree Coal Company.	Stockton.	A.R.	1.02	36.94	61.68	0.0053	10.36	2.55	..	..	..	..	..	..	..	..	..
317	Kentucky C. & L. Co. (Cambria).	Coalburg.	A.R.	0.65	33.73	65.87	0.008	9.75	0.70	..	..	..	..	..	..	..	..	..
317	Kentucky C. & L. Co. (Cambria).	Coalburg.	A.D.	1.98	33.07	68.37	0.008	6.68	0.64	76.36	5.33	9.85	1.14	13,920	13,675	4.62	..	..
318	Kentucky C. & L. Co. (Mt. Carmel).	Coalburg.	A.R.	2.54	32.88	67.93	0.008	6.65	0.64	75.93	5.39	10.25	1.14	13,847	13,619	4.49	..	..
318	Kentucky C. & L. Co. (Mt. Carmel).	Coalburg.	A.D.	1.60	33.60	67.35	0.005	7.45	2.07	75.00	5.56	8.76	1.16	13,839	13,764	4.63	..	..
319	Kentucky C. & L. Co. (National).	Coalburg.	A.R.	2.12	32.42	67.05	0.005	7.41	2.06	74.55	5.62	9.20	1.16	13,766	13,699	4.49	..	..
319	Kentucky C. & L. Co. (National).	Coalburg.	A.D.	1.85	32.25	65.38	0.007	10.62	0.59	74.18	5.11	8.57	0.93	13,406	13,319	3.87	..	..
320	Coal Bell Coal Company (Irees).	Coalburg.	A.R.	2.28	32.11	65.03	0.007	10.58	0.59	73.86	5.16	8.88	0.93	13,358	13,278	3.79	..	..
320	Coal Bell Coal Company (Irees).	Coalburg.	A.D.	3.60	31.95	64.98	0.005	9.47	1.21	75.00	5.00	8.33	1.09	13,586	13,419	4.24	..	..
321	Coal Bell Coal Company (Flinn).	Coalburg.	A.R.	3.86	31.87	64.82	0.005	9.45	1.21	74.80	5.03	8.42	1.09	13,550	13,397	4.19	..	..
321	Coal Bell Coal Company (Flinn).	Coalburg.	A.D.	2.00	33.65	67.37	0.010	6.98	0.90	75.82	5.56	9.75	0.99	13,964	13,756	4.53	..	..
324	Greendale Mining Co.	Coalburg.	A.R.	2.47	33.50	67.08	0.010	6.95	0.90	75.47	5.61	10.08	0.99	13,898	13,711	4.43	..	..
324	Greendale Mining Co.	Coalburg.	A.D.	2.00	33.70	67.90	0.005	6.40	0.70	79.09	5.33	7.46	1.02	14,176	14,260	5.71	..	..
327	Lackawanna C. & L. Co. (David Swartz).	Coalburg.	A.R.	2.18	33.64	67.79	0.005	6.39	0.70	78.95	5.35	7.59	1.02	14,151	14,240	5.65	..	..
328	John Summers.	Coalburg.	A.R.	1.50	32.44	69.77	0.007	6.29	0.58	..	..	..	..	..	..	..	..	..
329	C. C. Sharp.	Coalburg.	A.R.	1.65	33.11	69.09	0.004	6.25	0.70	..	..	..	..	..	..	..	..	..
347	George Rader.	Coalburg.	A.R.	0.63	35.31	65.53	0.003	8.53	0.70	76.71	5.03	7.82	1.21	13,600	13,700	4.70	..	..
350	Elk River Coal & Lumber Co.	Coalburg.	A.R.	0.79	38.57	65.26	0.007	5.38	1.74	..	..	..	..	..	..	..	..	..
357	Henry Herold.	Coalburg.	A.R.	0.97	34.21	62.81	0.009	12.01	0.99	..	..	..	..	..	..	..	..	..
360	Mollie Frame.	Coalburg.	A.R.	0.61	39.29	61.70	0.007	8.40	2.68	..	..	..	..	..	..	..	..	..
362	Hawkins-Kinney Estate.	Coalburg.	A.R.	0.89	38.22	63.84	0.005	7.05	1.25	78.14	5.53	6.84	1.19	14,150	14,280	5.63	..	..
366	Henry Herold.	Coalburg.	A.R.	0.97	36.85	62.17	0.011	10.01	1.15	..	..	..	..	..	..	..	..	..
370	Ballard Scott.	Coalburg.	A.R.	0.57	38.18	60.55	0.008	10.70	0.80	..	..	..	..	..	..	..	..	..
371	Tioga Lumber Company.	Coalburg.	A.R.	0.55	33.46	64.04	0.003	4.35	0.73	..	..	..	..	..	..	..	..	..
381	A. M. C. Hutchinson.	Coalburg.	A.R.	1.22	37.73	62.40	0.008	8.59	1.20	..	..	..	..	..	..	..	..	..
384	J. H. Baker.	Coalburg.	A.R.	1.12	35.25	63.26	0.009	10.37	0.95	..	..	..	..	..	..	..	..	..
385	David Brown.	Coalburg.	A.R.	1.39	34.39	60.61	0.007	7.61	0.65	77.05	5.16	8.26	1.27	13,750	13,790	4.86	..	..
386	R. M. Duffy.	Coalburg.	A.R.	1.33	34.19	65.95	0.014	8.53	0.89	..	..	..	..	..	..	..	..	..
392	O. C. Lewis et al.	Coalburg.	A.R.	0.82	34.26	64.40	0.007	15.52	1.22	..	..	..	..	..	..	..	..	..
395	Claude Braden.	Coalburg.	A.R.	1.07	35.32	67.69	0.006	5.92	1.24	..	..	..	..	..	..	..	..	..
	Average.	Coalburg.	A.D.	2.17	33.04	66.86	0.007	8.05	0.80	..	..	..	..	..	..	..	..	..
	Average.	Coalburg.	A.R.	2.17	33.04	66.86	0.007	7.93	1.02	75.91	5.31	8.77	1.09	13,616	13,699	4.60	..	..
	Average.	Coalburg.	A.R.	1.39	35.71	64.54	0.007	8.36	1.03	76.16	5.32	8.59	1.11	13,756	13,746	4.69	..	..

Survey Table of Coal Analyses. (Continued).

No. on Map	Mine.	Coal Bed.	Condition of Sample	Proximate.				Common to Both		Ultimate.				Calorimeter B. T. U.	For 1 lb. of Coal	Calculated B. T. U.	For 1 lb. of Coal	Carbon divided by Oxygen + Ash
				Moisture	Volatile Matter	Fixed Carbon	Phosphorus	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen					
409	Lewis Coal & Land Company.	Winifrede.	A.R.	5.87	86.17	53.33	0.006	4.63	0.54
424	A. M. C. Hutchinson.	Winifrede.	A.R.	1.08	83.48	53.99	0.006	11.45	1.90
529	Lewis Coal & Land Company.	Alma.	A.R.	3.47	84.83	53.66	0.006	8.04	0.87
534	Lewis Coal & Land Company.	Alma.	A.R.	0.66	89.14	53.07	0.006	7.13	3.63
538	John A. Stowers.	Alma.	A.R.	0.64	84.28	55.42	0.005	9.66	1.46
553	Average.	Alma.	A.R.	1.20	86.34	56.45	0.005	6.01	0.67
553	Eagle Gas Coal Company.	Campbell Creek (Peerless).	A.R.	0.83	86.59	54.98	0.005	7.60	1.92
553	Eagle Gas Coal Company.	Campbell Creek (Peerless).	A.D.	1.15	86.69	52.37	0.004	9.79	0.78
554	W. L. Walker Estate (W. Va. Timber Co.).	Campbell Creek (Peerless).	A.R.	1.15	86.69	52.37	0.004	9.79	0.78
561	Irvin Hughes.	Campbell Creek (Peerless).	A.R.	0.66	86.83	61.03	0.004	1.48	0.67
568	Gauley Mountain Coal Co. (Buck Run No. 1).	Campbell Creek (Peerless).	A.R.	1.02	82.73	44.17	0.010	12.08	1.10
569	Gauley Mountain Coal Co. (No. 2).	Campbell Creek (Peerless).	A.R.	0.77	84.88	55.77	0.015	8.58	0.96
574	C. C. Sharp.	Campbell Creek (Peerless).	A.R.	0.67	86.54	57.52	0.003	5.27	1.32
579	Lewis Coal & Land Company.	Campbell Creek (Peerless).	A.R.	0.47	86.18	61.82	0.002	1.53	0.77
611	Average.	Campbell Creek (Peerless).	A.R.	1.63	85.46	61.35	0.006	1.56	0.74
611	Gauley Mountain Coal Co. (Buck Run No. 1).	Campbell Creek (Peerless).	A.R.	0.91	87.04	56.29	0.009	5.76	0.91
621	Frank Johnson.	Campbell Creek (No. 2 Gas).	A.R.	0.65	86.76	57.13	0.006	5.46	0.91
625	Freemont Pearson.	Campbell Creek (No. 2 Gas).	A.R.	0.47	86.12	58.28	0.049	5.13	1.00
629	John Hypes.	Campbell Creek (No. 2 Gas).	A.R.	0.55	87.07	57.44	0.001	4.34	1.40
636	Flynn Lunsber Company.	Campbell Creek (No. 2 Gas).	A.R.	0.87	87.07	58.09	0.003	3.97	1.70
637	H. W. Herold.	Campbell Creek (No. 2 Gas).	A.R.	0.96	85.69	60.56	0.003	2.79	0.89
645	M. C. Woods.	Campbell Creek (No. 2 Gas).	A.R.	0.96	87.24	59.53	0.004	2.27	1.02
645	Average.	Campbell Creek (No. 2 Gas).	A.R.	1.23	85.62	60.59	0.003	2.56	0.73
645	Average.	Campbell Creek (No. 2 Gas).	A.R.	0.81	86.60	58.80	0.010	3.79	1.09
645	Average.	Campbell Creek (No. 2 Gas).	A.R.	1.23	85.62	60.59	0.003	2.56	0.73
645	Average.	Campbell Creek (No. 2 Gas).	A.R.	1.23	85.62	60.59	0.003	2.56	0.73
645	Average.	Campbell Creek (No. 2 Gas).	A.R.	1.23	85.62	60.59	0.003	2.56	0.73
645	Average.	Campbell Creek (No. 2 Gas).	A.R.	1.23	85.62	60.59	0.003	2.56	0.73
645	Average.	Campbell Creek (No. 2 Gas).	A.R.	1.23	85.62	60.59	0.003	2.56	0.73
645	Average.	Campbell Creek (No. 2 Gas).	A.R.	1.23	85.62	60.59	0.003	2.56	0.73
645	Average.	Campbell Creek (No. 2 Gas).	A.R.	1.23	85.62	60.59	0.003	2.56	0.73
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645	Average.	Campbell Creek (No. 2 Gas).	A.R.	1.23	85.62	60.59	0.003	2.56	0.73
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645	Average.	Campbell Creek (No. 2 Gas).	A.R.	1.23	85.62	60.59	0.003	2.56	0.73
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645	Average.	Campbell Creek (No. 2 Gas).	A.R.	1.23	85.62	60.59	0.003	2.56	0.73
645	Average.	Campbell Creek (No. 2 Gas).	A.R.	1.23	85.62	60.59	0.003	2.56	0.73
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645	Average.	Campbell Creek (No. 2 Gas).	A.R.	1.23	85.62	60.59	0.003	2.56	0.73
645	Average.	Campbell Creek (No. 2 Gas).	A.R.	1.23	85.62	60.59	0.003	2.56	0.73
645	Average.	Campbell Creek (No. 2 Gas).	A.R.	1.23	85.62	60.59	0.003	2.56	0.73
645	Average.	Campbell Creek (No. 2 Gas).	A.R.	1.23	85.62	60.59	0.003	2.56	0.73
645	Average.	Campbell Creek (No. 2 Gas).	A.R.	1.23	85.62	60.59	0.003	2.56	0.73
645	Average.	Campbell Creek (No. 2 Gas).	A.R.	1.23	85.62	60.59	0.003	2.56	0.73
645	Average.	Campbell Creek (No. 2 Gas).	A.R.	1.23	85.62	60.59	0.003	2.56	0.73
645	Average.	Campbell Creek (No. 2 Gas).	A.R.	1.23	85.62	60.59	0.003	2.56	0.73
645	Average.	Campbell Creek (No. 2 Gas).	A.R.	1.23	85.62	60.59	0.003	2.56	0.73
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645	Average.	Campbell Creek (No. 2 Gas).	A.R.	1.23	85.62	60.59	0.003	2.56	0.73
645	Average.	Campbell Creek (No. 2 Gas).	A.R.	1.23	85.62	60.59	0.003	2.56	0.73
645	Average.	Campbell Creek (No. 2 Gas).	A.R.	1.23	85.62	60.59	0.003	2.56	0.73
645	Average.	Campbell Creek (No. 2 Gas).	A.R.	1.23	85.62	60.59	0.003	2.56	0.73
645	Average.	Campbell Creek (No. 2 Gas).	A.R.	1.23	85.62	60.59	0.003	2.56	0.73									

Survey Table of Coal Analyses. (Continued).

No. on Map	Mine.	Coal Bed.	Condition of Sample	Proximate.					Come on to Both		Ultimate.				Calorimeter B. T. U.	For 1 lb. of Coal	Calculated B. T. U.	For 1 lb. of Coal	Carbon Divided by Oxygen + Ash
				Moisture	Volatile Matter	Fixed Carbon	Phosphorus	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen						
														Ash						Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen
702																			
702	Greenbrier Coal Co.	Eagle	A.D.	0.96	37.78	57.36	0.004	3.90	0.52	81.20	5.91	6.98	1.49	14,850	14,960	14,960	7.46		
705	Greenbrier Coal Co.	Eagle	A.R.	2.35	37.25	56.55	0.004	3.85	0.52	80.06	5.98	8.13	1.46	14,650	14,750	14,750	6.68		
705	N. D. Backus	Eagle	A.D.	0.96	36.29	55.16	0.004	7.29	0.56	79.15	5.42	5.73	1.55	14,630	14,460	14,460	5.94		
720	E. M. Keenan	Eagle	A.R.	0.96	36.29	55.16	0.004	7.59	0.56	79.15	5.42	5.73	1.55	14,630	14,460	14,460	5.94		
730	C. C. Sharp	Eagle	A.R.	0.75	31.81	63.29	0.005	4.15	0.58	80.85	5.84	8.09	1.43	14,580	14,470	14,470	6.89		
736	Joseph Dorsy	Eagle	A.R.	0.92	34.07	61.37	0.006	3.64	0.65	80.85	5.84	8.09	1.43	14,580	14,470	14,470	6.89		
743	Alex. Backus	Eagle	A.R.	0.75	32.44	62.67	0.015	4.14	0.63	80.85	5.84	8.09	1.43	14,580	14,470	14,470	6.89		
749	Charles Legg	Eagle	A.R.	1.57	33.76	60.66	0.011	4.01	0.66	80.85	5.84	8.09	1.43	14,580	14,470	14,470	6.89		
751	Edwin Bell	Eagle	A.R.	1.74	33.61	58.18	0.032	6.47	0.74	80.85	5.84	8.09	1.43	14,580	14,470	14,470	6.89		
759	J. E. Hardway	Eagle	A.R.	0.40	34.37	49.03	0.129	16.20	0.77	80.85	5.84	8.09	1.43	14,580	14,470	14,470	6.89		
765	J. H. Hughes	Eagle	A.R.	0.48	31.05	60.00	0.008	5.47	0.78	80.85	5.84	8.09	1.43	14,580	14,470	14,470	6.89		
771	Clark Bell	Eagle	A.R.	0.85	32.45	63.07	0.006	3.63	0.70	80.85	5.84	8.09	1.43	14,580	14,470	14,470	6.89		
773	Allen Rader	Eagle	A.R.	0.91	34.70	59.52	0.009	4.87	0.66	80.85	5.84	8.09	1.43	14,580	14,470	14,470	6.89		
782	Joseph A. McClung	Eagle	A.R.	1.01	37.20	59.64	0.003	2.15	0.70	80.85	5.84	8.09	1.43	14,580	14,470	14,470	6.89		
784	O. H. Carden	Eagle	A.R.	1.14	36.11	60.78	0.004	1.97	0.69	82.40	5.63	7.96	1.35	15,100	14,850	14,850	8.30		
785	Moses Neal	Eagle	A.R.	0.62	34.13	59.66	0.005	1.90	0.63	82.40	5.63	7.96	1.35	15,100	14,850	14,850	8.30		
790	Austin Bryant	Eagle	A.R.	1.13	29.64	63.09	0.005	6.14	0.63	82.40	5.63	7.96	1.35	15,100	14,850	14,850	8.30		
799	Lemon J. Groves	Eagle	A.R.	0.95	33.45	61.25	0.006	4.35	0.67	82.40	5.63	7.96	1.35	15,100	14,850	14,850	8.30		
804	Theodore Dorsy	Eagle	A.R.	1.06	35.37	58.79	0.005	4.78	0.98	82.40	5.63	7.96	1.35	15,100	14,850	14,850	8.30		
822	A. A. Bibb	Eagle	A.R.	0.56	28.73	56.98	0.010	33.73	0.46	82.40	5.63	7.96	1.35	15,100	14,850	14,850	8.30		
838	T. F. Hicks	Eagle	A.R.	0.89	31.66	57.40	0.005	10.05	0.66	82.40	5.63	7.96	1.35	15,100	14,850	14,850	8.30		
840	John Woods	Eagle	A.R.	1.04	23.62	69.20	0.008	6.14	0.56	77.92	5.49	8.56	1.33	14,290	14,100	14,100	5.30		
	Average			0.25	35.39	57.13	0.004	7.33	0.82	82.40	5.63	7.96	1.35	15,100	14,850	14,850	8.30		
	Jonathan Brown	Eagle	A.R.	1.07	32.51	64.00	0.004	2.42	0.56	82.40	5.63	7.96	1.35	15,100	14,850	14,850	8.30		
	A. A. Bibb	Eagle	A.R.	1.28	34.24	62.55	0.004	1.93	0.89	82.40	5.63	7.96	1.35	15,100	14,850	14,850	8.30		
	T. F. Hicks	Eagle	A.R.	1.16	32.85	60.86	0.007	5.13	0.60	82.40	5.63	7.96	1.35	15,100	14,850	14,850	8.30		
	Abram Hanna	Eagle	A.R.	0.93	32.07	64.76	0.006	12.24	1.13	82.40	5.63	7.96	1.35	15,100	14,850	14,850	8.30		
	John Woods	Eagle	A.R.	0.71	32.85	64.79	0.007	11.65	0.95	82.40	5.63	7.96	1.35	15,100	14,850	14,850	8.30		
	Average			0.96	33.04	56.26	0.004	5.74	0.54	80.18	5.66	6.36	1.52	14,740	14,710	14,710	6.70		
849	Mileus Simms	Little Eagle	A.R.	1.00	33.43	59.74	0.012	5.83	0.71	78.98	5.49	7.67	1.40	14,440	14,323	14,323	6.16		
858	Lorenz Dorsy	Little Eagle	A.R.	0.55	35.61	60.96	0.005	2.88	0.80	82.40	5.63	7.96	1.35	15,100	14,850	14,850	8.30		
	Average			0.98	35.69	59.20	0.004	4.13	0.62	82.40	5.63	7.96	1.35	15,100	14,850	14,850	8.30		
	Little Eagle	Little Eagle	A.R.	0.77	35.65	60.08	0.0045	3.50	0.71	82.40	5.63	7.96	1.35	15,100	14,850	14,850	8.30		

* Not included in average.

Survey Table of Coal Analyses. (Continued).

No. on Map II.	Mine.	Coal Bed.	Condition of Sample	Proximate.						Common to Both		Ultimate.				Calorimeter B. T. U. for 1 lb. of Coal	Calculated B. T. U. for 1 lb. of Coal	Carbon Divided by Oxygen + Ash
				Moisture	Volatile Matter	Fixed Carbon	Phosphorus	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen					
937	John Haistead	Gilbert	A. K.	0.40	37.40	58.70	0.003	3.50	1.29	81.19	5.51	6.97	1.54	14,800	14,740	7.75		
944	Frank Graves	Gilbert	A. K.	0.34	38.63	55.66	0.002	5.37	2.33	.....	.....	.....	.....	.....	.....	.....
947	Betty Painter	Gilbert	A. R.	0.78	36.77	59.18	0.002	3.37	1.24	.....	.....	.....	.....	.....	.....	.....
948	Lycurgus Campbell	Gilbert	A. R.	1.31	35.30	59.95	0.003	3.44	1.04	80.67	5.88	8.04	1.43	14,550	14,490	7.03		
951	Mary Boller	Gilbert	A. R.	0.81	36.55	58.47	0.003	4.17	1.17	.....	.....	.....	.....	.....	.....	.....
953	O. E. Dorsey	Gilbert	A. K.	0.73	37.10	59.19	0.004	2.96	1.24	.....	.....	.....	.....	.....	.....	.....
957	Sammul Sebirt	Gilbert	A. K.	0.90	34.27	57.50	0.003	7.33	1.55	.....	.....	.....	.....	.....	.....	.....
971	Bina Sparks	Gilbert	A. R.	0.33	34.77	53.44	0.074	11.46	1.54	.....	.....	.....	.....	.....	.....	.....
983	James King	Gilbert	A. R.	1.03	36.40	60.95	0.002	1.62	0.78	.....	.....	.....	.....	.....	.....	.....
1072	Average	Gilbert, "B"	A. R.	0.74	36.35	58.12	0.011	4.79	1.35	80.93	5.45	7.50	1.48	14,675	14,615	7.89		
1093	John Spencer	Jaeger Ferry	A. R.	0.77	35.99	55.53	0.009	7.71	2.71	.....	.....	.....	.....	.....	.....	.....
1098	M. R. Groves	Hughes Ferry	A. R.	0.98	33.30	60.41	0.015	5.31	1.20	.....	.....	.....	.....	.....	.....	.....
1099	Mountain City Lumber Co.	Hughes Ferry	A. R.	0.60	34.30	60.84	0.012	4.26	0.70	81.88	5.24	6.55	1.37	14,800	14,680	7.57		
1101	Gauley Coal Land Co. (Donald Thomas)	Hughes Ferry	A. R.	0.53	31.02	66.03	0.006	1.82	0.73	.....	.....	.....	.....	.....	.....	.....
1121	Average	Hughes Ferry	A. K.	0.70	32.87	62.63	0.011	3.80	0.88	.....	.....	.....	.....	.....	.....	.....
1121	Gauley Coal Land Co.	Lower Jaeger	A. R.	0.89	30.51	59.20	0.007	9.40	1.04	.....	.....	.....	.....	.....	.....	.....
1123	Gauley Coal Land Co.	Castle	A. R.	0.89	30.41	66.28	0.003	2.42	0.60	.....	.....	.....	.....	.....	.....	.....
1126	V. H. O'Dell	Castle	A. R.	0.35	32.06	66.18	0.005	1.41	0.69	.....	.....	.....	.....	.....	.....	.....
1128	B. & O. R. Co. (John Strader)	Castle	A. R.	1.00	30.34	61.16	0.010	7.50	0.80	.....	.....	.....	.....	.....	.....	.....
1134	Lewis et al.	Castle	A. R.	7.36	35.46	62.68	0.004	4.50	0.52	.....	.....	.....	.....	.....	.....	.....
1140	Average	Castle	A. R.	2.40	32.07	61.57	0.0045	3.96	0.67	.....	.....	.....	.....	.....	.....	.....
1140	Charles Stanley	Sewell "B"	A. R.	0.81	30.19	67.16	0.003	1.84	0.84	.....	.....	.....	.....	.....	.....	.....
1151	Kanawha & Michigan Ry.	Sewell	A. K.	3.94	27.16	62.98	0.007	5.92	0.55	.....	.....	.....	.....	.....	.....	.....
1152	Flynn Lumber Co.	Sewell	A. D.	0.79	31.11	64.05	0.004	3.45	0.48	83.40	5.52	5.94	1.21	14,970	15,110	8.88		
1152	Flynn Lumber Co.	Sewell	A. R.	1.04	31.04	64.48	0.004	3.44	0.48	83.19	5.54	6.14	1.21	14,930	15,070	8.68		
1154A	.....	Sewell	A. R.	0.43	31.85	65.55	0.024	4.17	3.78	73.83	4.59	4.63	1.00	13,390	13,350	4.39	
1159	Cherry River B. & L. Co.	Sewell	A. R.	1.21	31.93	64.81	0.014	2.05	0.69	.....	.....	.....	.....	.....	.....	.....
1162	L. D. Conley (B. & O. R.)	Sewell	A. R.	0.78	29.17	65.91	0.003	4.14	0.87	83.00	4.94	5.83	1.22	14,790	14,780	8.33		
1167A	Elk Lick Coal Co.	Sewell	A. K.	0.63	26.90	66.77	0.112	5.04	0.69	.....	.....	.....	.....	.....	.....	.....
1168	Pardee & Currin Lumber Co.	Sewell	A. R.	0.83	30.64	66.58	0.005	1.95	0.63	.....	.....	.....	.....	.....	.....	.....
1170	Charles Bennett	Sewell	A. R.	0.90	29.40	66.55	0.012	2.85	0.65	.....	.....	.....	.....	.....	.....	.....
1175	Saxman Coal & Coke Co. (No. 1)	Sewell	A. D.	0.73	27.00	65.55	0.019	6.72	0.67	82.25	5.06	3.95	1.35	14,430	14,720	7.77		
1175	Saxman Coal & Coke Co. (No. 1)	Sewell	A. R.	2.24	26.58	64.56	0.019	6.62	0.66	81.00	5.15	5.24	1.33	14,210	14,500	6.83		

Page References to Detailed Descriptions and Sections of
Coal Mines Listed in Preceding Table.

No. on Map II.	Sample No.	Coal Bed and Name of Owner	Location	Page
Lower Freeport				
18	10-P	Tioga Lumber Company...	2.1 mi. N. W. of Tioga.....	437
Upper Kittanning				
21	270-R	J. D. Acre.....	1.4 mi. N.W. of Dade.....	441
28	331-R	Martin V. Dodrill.....	1.4 mi. N.W. of Skyles.....	442
31	330-R	Tioga Lumber Company...	3.6 mi. N. 58° W. of Tioga.....	443
36	3-P	L. H. Corran.....	1.0 mi. N.W. of Hookersville.....	444
40	335-R	Tioga Lumber Company...	1.7 mi. N. 66° W. of Tioga.....	445
Middle Kittanning				
58	244-R	Tioga Lumber Company (Margaret Strange)....	1.2 mi. S.W. of Boggs.....	452
60	333-R	Tioga Lumber Company...	1.6 mi. N. 15° W. of Tioga.....	453
65	251-R	McQueen Bros.....	1.4 mi. N. 23° E. of Hookersville...	454
79	9-R	Tioga Lumber Company...	0.3 mi. N. 75° W. of Tioga.....	457
Lower Kittanning.				
92	283-R	Melvin Williams.....	0.8 mi. N. 35° W. of Harriet.....	463-4
94	286-R	Lewis Coal & Land Co....	0.9 mi. S. 63° W. of Harriet.....	464
99	281-R	Logan Grose.....	0.8 mi. N. 73° E. of Lone Star School.	465
106	273-R	Caroline Workman.....	2.3 mi. N. 63° W. of Muddlety.....	466-7
112	902-H	Elk River Coal & Lumber Co. (Rich Run) (M. S.)..	0.5 mi. S.E. of Widen.....	468-71
112	903-H	Elk River Coal & Lumber Co. (Rich Run) (L. P.)..	0.5 mi. S.E. of Widen.....	468-71
112	904-H	Elk River Coal & Lumber Co. (Rich Run) (Bottom)	0.5 mi. S.E. of Widen.....	468-71
133	258-R	Elk River Coal & Lumber Company.....	3.6 mi. S. 74° E. of Widen.....	474
142	255-R	J. M. Butcher.....	At Dille.....	476
145	256-R	Elk River Coal & Lumber Company.....	0.9 mi. S. 21° E. of Dille.....	477
160	248-P	Tioga Lumber Company...	2.6 mi. N. 63° W. of Tioga.....	480
162	332-R	Tioga Lumber Company (John Roberts).....	2.3 mi. N. 78° W. of Boggs.....	481
165	334-R	Tioga Lumber Company...	2.2 mi. N. 44° W. of Tioga.....	482
166	1-P	Tioga Lumber Company...	1.5 mi. S. 60° W. of Boggs.....	483
179	259-R	R. M. Duffy.....	1.3 mi. N. 22° E. of Muddlety.....	486
181	287-R	McQueen Bros.....	1.4 mi. N. 14° E. of Hookersville...	486-7
192	7-P	Tioga Lumber Company...	2.3 mi. N. 71° W. of Delphi.....	491
198	6-P	Andrew McCoy.....	1.3 mi. N. 72° W. of Delphi.....	492-3
Clarion				
225	17-P	O. C. Lewis et al.....	0.7 mi. N. 30° E. of Opal.....	503
230	8-P	Tioga Lumber Company...	2.3 mi. N. 74° W. of Delphi.....	505
Stockton				
272	272-R	Elk River Coal & Lumber Company.....	0.4 mi. N. 24° E. of Dade.....	514
289	245-R	Craig Tract (Thomas Davis)	3.4 mi. E. of Birch River.....	518
Coalburg				
314	No. 10, p. 292, Bull. 2	Greenbrier Coal Company.	0.5 mi. S. 67° E. of Dixie.....	526
317	Table 14 No. 18, p. 284, Bull. 2	Kentucky Coal & Lumber Company (Cambria)....	0.7 mi. N. 32° W. of Dixie.....	527
318	No. 20, do.	Kentucky Coal & Lumber Company (Mt. Carmel)..	0.2 mi. E. of Cambria.....	527-8
319	No. 19, do.	Kentucky Coal & Lumber Company (National)....	0.6 mi. N.W. of Cambria.....	528
320	No. 17, do.	Coal Bell Coal Company (Trees).....	Just S.W. of Bentree.....	529
321	No. 16, do.	Coal Bell Coal Company (Flinn).....	Just East of Bentree.....	529-30
324	No. 21, do.	Greendale Mining Company	0.1 mi. S. of Greendale.....	530-1
337	309-R	Lackawanna Coal & Lum- ber Co. (David Swartz)..	3.3 mi. N. 83° E. of Swiss.....	533
338	302-R	John Farmers.....	2.2 mi. N. 76° E. of Lockwood.....	534
339	310-R	C. C. Sharp.....	3.0 mi. N. 25° E. of Lockwood.....	534
347	282-R	George Rader.....	2.0 mi. N. 66° W. of Gilboa.....	536-7
350	271-R	Elk River Coal & Lumber Company.....	0.5 mi. S. 70° W. of Dade.....	537-8
357	257-R	Henry Herold.....	3.5 mi. S. 59° E. of Widen.....	539-40

Page References to Detailed Descriptions and Sections of Coal Mines Listed in Preceding Table. (Continued).

No. on Map II.	No. Sample	Coal Bed and Name of Owner	Location	Page
360	253-R	Mollie Frame.....	0.3 mi. N. 56° W. of Birch River.....	540
362	4-P	Hawkins-Kinney Estate...	2.3 mi. S. 87° E. of Birch River.....	541
366	252-R	Henry Herrold.....	3.2 mi. S. 14° W. of Birch River.....	542
370	247-R	Ballard Scott.....	1.1 mi. S. 67° E. of Birch River.....	543
371	2-P	Tioga Lumber Company...	2.0 mi. S. 57° E. of Birch River.....	543
381	11-P	A. M. C. Hutchinson.....	0.6 mi. S. 12° W. of Opal.....	546
384	12-P	J. H. Baker.....	1.9 mi. N. W. of Calvin.....	546-7
385	13-P	David Brown.....	1.6 mi. N.W. of Calvin.....	547
386	260-R	R. M. Duffy.....	1.1 mi. N. 32° E. of Muddlety.....	547-8
392	16-P	O. C. Lewis et al.....	0.4 mi. N. 34° E. of Opal.....	549
395	242-R	Claude Braden.....	1.5 mi. N.W. of Calvin.....	550-1
Winifrede				
409	297-R	Lewis Coal & Land Co....	1.7 mi. S. 58° W. of Harriet.....	556-7
424	15-P	A. M. C. Hutchinson.....	0.7 mi. S. 8° W. of Opal.....	560
Alma				
529	284-R	Lewis Coal & Land Co....	2.8 mi. S. 68° W. of Harriet.....	572
534	296-R	Lewis Coal & Land Co....	1.8 mi. S. 45° W. of Harriet.....	573
538	289-R	John A. Stowers.....	0.7 mi. N. of Summersville.....	574
Campbell Creek (Peerless)				
553	307-R	Eagle Gas Coal Company..	0.2 mi. S. W. of Vaughan.....	579-80
554	304-R	W. L. Walker Estate (W. Va. Timber Company)...	At Vaughan.....	580-1
561	285-R	Irvin Hughes.....	4.1 mi. S. 58° W. of Harriet.....	582
568	339-R	Gauley Mountain Coal Co. (Buck Run No. 1).....	1.6 mi. E. of Belva.....	584
569	338-R	Gauley Mountain Coal Co. (No. 2).....	0.5 mi. S. of Jodie.....	584
574	311-R	C. C. Sharp.....	1.9 mi. N. 37° E. of Lockwood.....	585-6
579	295-R	Lewis Coal & Land Co....	1.7 mi. S. 44° W. of Harriet.....	587
Campbell Creek (No. 2 Gas)				
611	340-R	Gauley Mountain Coal Co. (Buck Run No. 1)...	1.2 mi. E. of Wyndal.....	595
621	315-R	Frank Johnson.....	0.7 mi. N. 5° W. of Vinton.....	598
625	320-R	Freemont Pearson.....	0.4 mi. N. 71° E. of Burl.....	599
629	275-R	John Hypes.....	1.8 mi. N. 20° E. of Gilboa.....	600
636	250-R	Flynn Lumber Company..	2.2 mi. N. 3° W. of Summersville.....	602
637	254-R	H. W. Herold.....	2.5 mi. S. of Muddlety.....	602
645	5-P	M. C. Woods.....	1.3 mi. N. 31° W. of Persinger.....	604-5
Eagle				
702	305-R	Greenbrier Coal Company.	0.7 mi. N.E. of Belva.....	615
705	306-R	N. D. Backus.....	1.0 mi. S. of Vaughan.....	616
720	298-R	E. M. Keenan.....	1.1 mi. N. 20° E. of Lockwood.....	619
730	299-R	C. C. Sharp.....	2.0 mi. N. 30° E. of Lockwood.....	622
736	300-R	Joseph Dorsey.....	1.8 mi. N. 29° W. of Drennen.....	623
742	324-R	Alex. Backus.....	1.7 mi. S. 19° E. of Tipton.....	625
745	314-R	Peter Keenan.....	1.2 mi. S. 8° E. of Tipton.....	625-6
749	312-R	Charles Legg.....	0.8 mi. N. of Albion.....	626-7
751	323-R	Edwin Bell.....	0.5 mi. N. 48° E. of Tipton.....	627-8
759	294-R	J. E. Hardway.....	1.9 mi. W. of Gilboa.....	529
765	293-R	John Hughes.....	0.7 mi. W. of Gilboa.....	631
771	276-R	Clark Bell.....	1.3 mi. N. 57° E. of Gilboa.....	632-3
773	274-R	Allen Rader.....	2.4 mi. N. 26° E. of Gilboa.....	633
777	319-R	Samuel McClung.....	1.0 mi. S. of Enon.....	634
782	292-R	Joseph A. McClung.....	1.5 mi. W. of Summersville.....	635-6
784	280-R	O. H. Carden.....	1.7 mi. N. 29° E. of Enon.....	636
785	277-R	Moses Neal.....	1.6 mi. N. 49° E. of Enon.....	636-7
790	278-R	Austin Bryant... (Cannel)	2.0 mi. N. 83° E. of Enon.....	637
790	279-R	Austin Bryant.....	2.0 mi. N. 83° E. of Enon.....	637
799	291-R	Lemon J. Groves.....	0.4 mi. W. of Summersville.....	639-40
800	317-R	Theodore Dorsey.....	1.6 mi. S. 37° W. of Summersville..	640
804	290-R	Jonathan Brown.....	0.9 mi. N. 9° E. of Summersville.....	641
822	14-P	A. A. Bibb.....	1.7 mi. N. 24° E. of Persinger.....	645
834	241-R	T. F. Hicks.....	1.5 mi. N. 73° E. of Nile.....	648
838	249-R	Abram Hanna.....	2.3 mi. N. of Beaver.....	649
840	337-R	John Woods.....	1.5 mi. S. 84° W. of Allingdale.....	649-50
Little Eagle				
849	303-R	Miletus Simms.....	0.1 mi. N. of Swiss.....	654
858	301-R	Lorenzo Dorsey.....	0.6 mi. W. of Drennen.....	656

Page References to Detailed Descriptions and Sections of
Coal Mines Listed in Preceding Table. (Concluded).

No. on Map II.	No. Sample	Coal Bed and Name of Owner	Location	Page
Gilbert				
937	321-R	John Halstead.....	1.6 mi. N. of Keslers Crosslanes.....	667-8
944	322-R	Frank Groves.....	1.6 mi. N. 30° W. of Keslers Crosslanes.....	669
947	325-R	Betty Painter.....	0.8 mi. N. 48° E. of Keslers Crosslanes.....	670
948	326-R	Lycurgus Campbell.....	1.8 mi. N. 60° E. of Keslers Crosslanes.....	670
951	328-R	Mary Boller.....	0.4 mi. W. of Sparks.....	671
953	327-R	O. E. Dorsey.....	0.3 mi. N. 32° W. of Sparks.....	671-2
957	318-R	Samuel Sebert.....	3.0 mi. W. of Summersville.....	673
971	336-R	Bina Sparks.....	0.2 mi. S. 42° E. of Beaver.....	675-6
988	346-R	James King.....	0.5 mi. S.E. of Mt. Nebo.....	679
Iaeger "B"				
1072	353-R	John Spencer.....	0.2 mi. N. 69° W. of Ophelia.....	313
Hughes Ferry (Iaeger)				
1093	355-R	M. R. Groves.....	1.0 mi. S. 46° E. of Deepwell.....	319
1099	347-R	Mountain City Lumber Co.	1.8 mi. N. 22° W. of Bruce.....	320
1101	345-R	Gauley Coal Land Company (Donald Thomas).....	0.8 mi. S. 43° W. of Bruce.....	321
Lower Iaeger				
1121	342-R	Gauley Coal Land Company Castle	0.7 mi. N. 72° E. of Runa.....	325
1123	329-R	Gauley Coal Land Company	1.9 mi. N. 41° W. of Mt. Nebo.....	327-8
1126	368-R	V. H. O'Dell.....	1.0 mi. N. 80° W. of Richwood.....	328
1128	360-R	B. & O. Railroad Co. (John Strader).....	1.0 mi. S. 75° E. of Nettie.....	329
1134	341-R	Lewis et al.....	1.7 mi. S. 55° W. of Mt. Lookout.....	330
Sewell "B"				
1140	361-R	Charles Stanley.....	0.8 mi. N. 45° W. of Dain.....	333
Sewell				
1151	313-R	Kanawha & Michigan Rail- way.....	0.9 mi. S. 67° E. of Vinton.....	683
1152	308-R	Flynn Lumber Company...	3.7 mi. S. 47° E. of Swiss.....	683
1154A	914-H		0.5 mi. N.W. of Carnifex Ferry.....	684
1159	370-R	Cherry River Boom & Lum- ber Company.....	0.2 mi. S. 18° W. of Coal Siding.....	686
1162	362-R	L. D. Copley (B. & O.R.R.)	0.2 mi. E. of Fenwick.....	687
1167A	211-R	Elk Lick Coal Company	4.5 mi. N. 87° E. of Richwood.....	688
1168	371-R	Pardee & Curtin Lumber Company.....	0.5 mi. S. 38° E. of Curtin.....	689
1170	369-R	Charles Bennett.....	0.5 mi. S. 83° W. of Holcomb.....	690
1175	375-R	Saxman Coal & Coke Com- pany (No. 1).....	0.1 mi. E. of Saxman.....	691-2
1177	373-R	Saxman Coal & Coke Com- pany (No. 3).....	1.4 mi. S. 86° W. of Saxman.....	691-2
1178	374-R	Saxman Coal & Coke Com- pany (No. 4).....	1.5 mi. S. of Saxman.....	692
1180	366-R	Gauley Coal Land Company	3.0 mi. S. 7° W. of Saxman.....	693
1182	376-R	John A. Bailes.....	2.8 mi. S. 22° E. of Saxman.....	693
1189	372-R	Pardee & Curtin Lumber Company.....	2.1 mi. N. 86° E. of Lowland.....	695
1192	359-R	Pardee & Curtin Lumber Company.....	2.8 mi. S. 39° W. of Curtin.....	696
1202	367-R	Gauley Coal Land Company (Daniel O'Dell).....	2.7 mi. S. 68° E. of Leivasy.....	698
1208	365-R	Tidewater Coal Company (Tony Jones).....	1.5 mi. S. 74° E. of Leivasy.....	700
1214	364-R	Tidewater Coal Company (Henry Amick).....	0.5 mi. S. E. of Carl.....	701
1220	363-R	Wm. Amick.....	0.9 mi. S. of Leivasy.....	703
1224	350-R	Marvin McClung.....	2.2 mi. S. 16° E. of Hominy Falls.....	703-4
1229	353-R	Gauley Coal Land Company	1.7 mi. N. 80° E. of Bamboo.....	704-5
1230	348-R	Gauley Coal Land Company (Thos. Orndorff).....	1.3 mi. W. of Hominy Mill.....	705
1231	354-R	Pardee & Curtin Lumber Company.....	0.5 mi. N. 52° W. of Hominy Mill.....	705-6
1235	349-R	Granville O'Dell.....	1.5 mi. S. 25° W. of Hominy Falls.....	706-7
1237	351-R	Gauley Coal Land Company	1.0 mi. S. 8° E. of Bamboo.....	707
1239	352-R	Lemuel Helms.....	2.1 mi. S. 20° E. of Bamboo.....	707-8
1240	343-R	Gauley Coal Land Company (Joseph Amick).....	2.1 mi. S. 70° W. of Snow Hill.....	708
1242	344-R	Marvin Richardson.....	2.2 mi. N. 34° E. of Nutterville.....	708-9
1246	915-H	Wilderness Lumber Co.	At Nallen.....	709
Fire Creek				
1267A	309-R	Cherry River Boom & Lum- ber Co. (Camden-McGraw)	0.4 mi. E. of Bee Run.....	712-13
1269	377-R	Craig-Deitz Coal Company.	0.1 mi. W. of Dain.....	713
1273	210-R	Cherry River Boom & Lum- ber Co. (Camden-McGraw)	0.5 mi. N. of Dozway.....	714

TIOGA LUMBER COMPANY TABLE OF COAL ANALYSES.

The following table, compiled by Tucker, contains a list of 21 analyses of coals kindly offered to the Survey by the Tioga Lumber Company through its president, Mr. Leonard Harrison, of Wellsboro, Pa., the samples having been taken by George A. Harrison, Engineer for the Company, and the analyses made by the Fuel Testing Company, of Boston, Massachusetts. These samples which are doubtless as accurate as those of the Survey, cover several thousand acres of coal lands lying in the northeastern portion of the County in the vicinity of Tioga, where the Allegheny and upper Kanawha coals have been extensively prospected, and make a most valuable addition to this Chapter.

Numbers in the left- and right-hand columns refer to the mine numbers printed on Map II, and described serially in the text, a reference to each description being found after the table:

Tioga Lumber Company Table of Coal Analyses.

Survey Mine No.	Tioga Map No.	Name of Mine	Coal Bed	Moisture	Volatile Matter	Fixed Carbon	Ash	Sulphur	Thickness Inches	Partings Out Inches	Survey Mine No.
16	F	Head of Little Laurel.	Lower Freeport.	1.16	33.41	54.31	11.12	0.96	54 1/4	0	16
18	213F	Head Road Fork.	Lower Freeport.	0.99	33.44	55.11	10.46	1.16	47 3/4	0	18
		Average.	Lower Freeport.	1.07	33.43	54.71	10.79	1.06			
40	335F	Big Laurel.	Upper Kittanning.	1.08	32.78	54.12	12.02	0.93	66 1/4	2	40
41	351F	Mollohan.	Upper Kittanning.	1.22	33.46	54.84	10.48	0.88	48	0	41
42	275M	Garrett Hollow.	Upper Kittanning.	0.92	37.43	55.70	5.95	0.88	50 1/2	4 3/4	42
42	275M	Garrett Hollow.	Upper Kittanning.	0.96	36.61	55.73	6.70	0.89	50 1/2	0	42
		Average.	Upper Kittanning.	1.04	35.07	55.10	8.79	0.90			
161	216C	Head Road Fork.	Lower Kittanning (No. 5 Block)	(1.00)	33.74	56.92	8.34	1.07	51	4	161
163A	753C	Webster Twin (Upper Bank)	Lower Kittanning (No. 5 Block)	1.32	31.73	56.99	10.96	1.06	46	1/2	163A
163A	753C	Webster Twin (Lower Bank)	Lower Kittanning (No. 5 Block)	1.31	36.16	53.40	9.13	0.35	16 1/2	0	163A
165	580C	Norton Fork.	Lower Kittanning (No. 5 Block)	1.04	33.93	53.93	11.10	0.95	16 1/2	3	165
168	680C	Strange Hollow.	Lower Kittanning (No. 5 Block)	1.19	33.36	56.18	9.27	0.88	45 1/2	4 1/2	168
167	372C	Poplar Creek.	Lower Kittanning (No. 5 Block)	1.19	32.96	57.88	7.97	1.03	46 3/4	2 1/2	167
185	438C	Camp No. 12 (Hawkins-Kinney Estate).	Lower Kittanning (No. 5 Block)	0.84	35.16	58.54	8.46	0.91	53 1/2	1 3/2	185
189	68C	Falls Hollow.	Lower Kittanning (No. 5 Block)	1.04	33.73	58.80	6.43	1.06	66 1/4	4 1/2	189
190	54C	Lowry Hollow (Upper).	Lower Kittanning (No. 5 Block)	1.28	34.23	60.18	4.31	0.90	50	0	190
190	54C	Lowry Hollow (Lower).	Lower Kittanning (No. 5 Block)	1.06	30.95	61.10	6.90	0.76	12	0	190
192	85C	Muddlety.	Lower Kittanning (No. 5 Block)	1.18	34.58	57.66	6.58	1.06	46 1/2	5	192
198	47C	Andrew McCoy.	Lower Kittanning (No. 5 Block)	1.06	32.63	61.16	5.19	1.30	55 1/2	0	198
		Average.	Lower Kittanning (No. 5 Block)	1.14	33.63	57.39	7.84	0.94			
221	780W	Rock Camp Run.	Clarion.	1.19	34.33	59.47	5.01	1.12	55 1/2	6	221
227	437W	Camp No. 12 (Hawkins-Kinney Estate).	Clarion.	0.95	36.06	55.72	7.27	0.82	69 1/2	9	227
229	67W	Falls Hollow.	Clarion.	0.77	34.21	58.71	6.31	0.80	45 3/2	2 1/2	229
		Average.	Clarion.	0.97	34.87	57.96	6.20	0.91			

**Page References to Detailed Descriptions and Sections
of Coal Mines and Prospects Listed in Tioga Lumber Company
Table of Analyses.**

No. on Map II.	Coal Bed and Name of Mine.	Location	Page.
Lower Freeport			
16	Head of Little Laurel.....	1.85 mi. N.W. of Tioga.....	436
18	Head of Road Fork.....	2.1 mi. N.W. of Tioga.....	437
Upper Kittanning			
40	Big Laurel.....	1.7 mi. N. 66° W. of Tioga.....	445
41	Mollohan.....	1.5 mi. N.W. of Tioga.....	446
42	Garrett Hollow.....	1.8 mi. N.W. of Delphi.....	446
Lower Kittanning			
161	Head of Road Fork.....	2.7 mi. N. 71° W. of Tioga.....	481
163 A	Webster Twin.....	3 mi. N.W. of Tioga.....	482
165	Norton Fork.....	2.2 mi. N. 44° W. of Tioga.....	482
166	Strange Hollow.....	1.5 mi. S. 60° W. of Boggs.....	483
167	Poplar Creek.....	1.7 mi. N. 11° W. of Tioga.....	483
185	Camp No. 12 (Hawkins-Kinney Est.)	2.4 mi. N. 57° E. of Opal.....	488
189	Falls Hollow.....	2.6 mi. E. of Opal.....	489-90
190	Lowry Hollow.....	2.3 mi. N. 71° W. of Delphi.....	491
192	Muddlety.....	1.9 mi. N. 34° W. of Delphi.....	490
198	Andrew McCoy.....	1.3 mi. N. 72° W. of Delphi.....	492-3
Clarion			
221	Rock Camp Run.....	3 mi. westward from Tioga.....	502
227	Camp No. 12 (Hawkins-Kinney Est.)	2.4 mi. N. 41° E. of Opal.....	504
229	Falls Hollow.....	2.5 mi. S. 85° W. of Delphi.....	504-5

CHAPTER XI.

WATER-POWER, MINERAL WATERS, IRON ORE, AND FORESTS.

WATER-POWER.

AVAILABLE STREAMS.

No attempt of consequence has been made to utilize the streams of Nicholas for hydroelectric power. The town of Summersville receives its electric current for lights from a small dynamo installed at the mill of the Campbell Brothers, located on Muddlety Creek, about one mile eastward from the village, power from the dam being utilized in daylight to saw lumber and grind grain. At the Grassy Creek Falls in Kentucky District, Mr. P. K. Dotson has used a direct-drive water-wheel to elevate coal from a shaft and for grinding, sawing and other minor activities. At various other points in the county small water-wheel mills have been in operation for many years.

The streams worthy of attention for commercial power development are the Gauley, Meadow, Cherry, and Cranberry Rivers, and possibly Birch River, all of which have a variable run-off, much greater in spring and winter than in summer and fall. Of these streams gage readings and discharge measurements are available for Gauley River at Belva, at Brocks Bridge near Summersville, and at Allingdale, and similar records are available for Meadow River at Bays Ferry (Nallen), three miles below Russellville, and for Cherry River at Richwood. These records have already been published under descriptions of these drainage basins, pages 27-54 and 58-66. No records are available for Cranberry or Birch River.

Of the streams mentioned above, the Gauley, Meadow, Cherry, and Cranberry Rivers offer many natural advantages for economic power development, the most serious drawback being the presence of minable coal beds, partly above and partly below water-level, bringing into any projected system the question of riparian rights. All of these rivers have deep channels that are precipitous or gorge-like at many points offering an unlimited number of sites for dams, and as the rock strata along them consist largely of heavy sandstone beds, proper foundations are easily obtainable. The land included in their drainage basins is predominantly of the rough mountain type, mostly unfit for cultivation, insuring that a considerable portion of it will remain wooded for an indefinite period, and preserving a run-off much more even than would otherwise be the case.

The following table, prepared by Tucker and showing indicated horse-power developed by streams flowing through the County, is compiled from Tables 5 and 6, pages 404-405, of the Semi-Centennial History of West Virginia by Dr. J. M. Callahan, the tables in question being part of a special article on "Water Power Resources" by A. H. Horton, District Engineer, Water-Resources Branch, United States Geological Survey:

Table No. 5—Indicated Horse-Power Developed by Gauley River.

Section of Stream		Length miles.	Mean Drainage Area, Sq. mi.	Minimum Discharge, sec. ft.	Assumed Discharge for Maximum Development sec. ft.	Total Fall, ft.	Minimum Horse-power.	Assumed Maximum Horse-power.	Horse-power available from storage for		
From	To								12 months.	6 months.	3 months.
Source.....	Below Williams R.....	33	^a 181	38	217	2,000	1,750	10,000	.....	.....	.....
Below Williams R.....	Above Cranberry R.....	17	209	44	253	280	1,130	6,520	.....	.....	.....
Below Cranberry R.....	Above Meadow R.....	31	573	62	462	770	4,390	32,700	.....	.....	.....
Below Meadow R.....	Mouth.....	27	1,310	157	936	480	6,930	41,300	.....	.....	.....
Totals.....	.....	108	.....	.....	.....	3,530	14,200	90,520	14,120	28,240	56,480

^aTotal Area.^bFall reduced to 300 ft. by proposed Gauley reservoir.

Table No. 6—Indicated Horse-Power Developed by Tributaries of Gauley River.

Stream	Section		Length mi.	Mean Discharge Area sq. mi.	Minimum Discharge sec.-ft.	Assumed Discharge for Maximum Development, sec.-ft.	Total Fall Feet.	Minimum Horse-power.	Assumed Maximum Development. Horse-power.
	From	To							
Cranberry R.	Source	Mouth	30	102a	5	55	2,100	241	2,650
Cherry R.	Source	Mouth	25	168a	8	90	2,900	368	4,140
Musidley Cr.	Source	Mouth	22	68a	3	36	1,000	69	828
Honny Cr.	Source	Mouth	18	98a	5	53	1,500	172	1,830
Meadow R.	Source	below Big Clear Cr.	19	165a	8	89	1,400	258	2,860
Meadow R.	below Big Clear Cr.	2,300-ft. Contour.	18	222	10	119	300	276	3,280
Meadow R.	2,200-ft. Contour.	1,800-ft. Contour.	11	295	14	159	400	516	5,840
Meadow R.	1,800-ft. Contour.	Mouth	8	355	22	189	679	1,360	11,700
Twenty-mile Cr.	Source	Mouth	30	75a	4	40	1,400	129	1,990
Totals								3,889	34,418

* Total area.

MINERAL WATERS.

SULPHUR WELLS AND SPRINGS.

Nicholas County contains no medicinal springs that have been exploited as such. At the mouth of Anthony Creek on Birch River, however, the J. N. Dodrill Water Well (No. 25 on Map II), flows a strong stream of water that is highly impregnated with hydrogen sulphide and salt, its product having been used for the concentration of the latter mineral for many years subsequent to its completion about 1845. Inasmuch as the mixture mentioned above is reputed to be of value in treating many intestinal disorders it would seem that the water from this old well could be utilized with profit. The exact horizon from which the water comes is a matter of doubt, the total depth of the hole being reported as about 600 feet which would place its bottom somewhere in the New River Coal Group.

IRON ORE.

POSSIBLE SOURCES OF ORE.

Iron ore, in quantity and quality sufficiently good to compete at the present time with the commercial products of other mining regions, does not seem to be present in the surface deposits of Nicholas. Only scattered and lenticular nodules of iron carbonate were found in certain of the sandy and aluminous shales lying above and below the coal seams of the Allegheny and Pottsville Series in various localities in the County. Their presence, as noted in the Measured Sections of Chapter IV, the stratigraphic descriptions in Chapters V to VII, inclusive, and under the descriptions of Commercial Coal in Chapter X, is of such scant quantity as to warrant the statement that iron ore in commercial proportions will never be found in the Pennsylvanian Rocks of the County.

Attention may be called, however, to the red Mauch Chunk Shales that outcrop on the South Fork of Cherry River above Richwood (See Map II). These shales contain a small proportion of iron oxide, probably varying from 5 to

10 per cent., the sum total of which for any given region in these huge beds is great. While it is true that this iron oxide can not now be classed as "ore" in the generally accepted trade meaning of the term, the well-known ability of the mining profession to devise methods for handling low-grade deposits, long regarded as worthless, provided they occur in such quantity as to warrant the installation of large and efficient labor-saving machinery, has been such as to make it seem barely possible that at some future date, when all the richer ores have been exhausted, the Mauch Chunk Shales can be mined for ore.

FORESTS.

ORIGINAL FOREST CONDITIONS.

In Volume V, page 218, of the State Survey Reports (1908), by A. B. Brooks, State Forester, there is a description of the "Original Forest Conditions" of Nicholas County that is highly important in revealing the character of the timber best suited to the area, some of the species having now almost vanished, the statement being republished in full below:

"In the hardwood forests of the county white oak, red oak, chestnut oak, yellow poplar, hickory, beech, and maple were among the commonest species. With these grew nearly all other hardwoods common in the forests of central West Virginia. Black walnut was very abundant and of excellent quality in several localities. Hemlock was the principal softwood, being distributed generally over the county. Small areas of spruce grew in the high mountains in the extreme eastern corner."

PRESENT FOREST CONDITIONS.

In the same volume mentioned above, page 220, Mr. Brooks gives the following summary of "Present Forest Conditions":

"The 130,000 acres of virgin forest that still remains in the county lies principally in large boundaries to the southeast of the Gauley River and in the northern end of the county. A few smaller tracts are to be found in other sections. There are approximately 112,000 acres of cut-over forest land, the largest body of which lies on the

waters of Cherry River in the eastern end. Other large areas are to be found along the western border and smaller areas on the north and south. As a whole the forests lie east of the Gauley River and in a broad belt along the western side with a large area of farm land lying between on the west of Gauley River.

"About 70 per cent. of the county is wooded. This includes, in addition to the areas of virgin and cut-over forests, about 50,000 acres of woodland owned in small boundaries by the farmers. As a rule the farmers' woodlots contain some fairly good timber."

A very considerable portion of the 130,000 acres of virgin forest mentioned in the above quotation has now been deforested so that probably not more than 25,000 to 30,000 acres of virgin forest remain and the area of cut-over land is correspondingly increased.

AREAS SUITABLE FOR REFORESTATION.

The topography of a considerable portion of Nicholas is so rough that it would seem probable that some Government or State policy of keeping the mountain sides and ridges of these regions in perpetual forest would be advisable, confining agriculture mainly to the valleys and lower portions of the uplands, except in the plateau region south of Gauley where the broad ridges constitute the tillable land and the valleys are mainly steep gorges unfit for cultivation.

FOREST PROTECTION SERVICE.

Some of the large landowners of Nicholas are subscribers to the Central West Virginia Fire Protective Association, a semi-official organization, supported in part by State and Government funds, but largely by private assessment based on acreage. This association has several lookout stations and patrol routes and since its organization has saved much valuable timber from fire. In addition to this semi-public body the various companies keep private patrolmen on their property during the dry seasons of spring and fall who help reduce the fire hazard to the desired minimum.

LUMBER MILLS.

Aside from a considerable amount of timber being sawed by small portable mills, no account of which is available, the following are the principal wood-working establishments:

The **Cherry River Boom and Lumber Company**, operating mills at Richwood, Holcomb, and Gauley Mills, the **J. D. Westcott & Sons**, manufacturing broom handles and chair stock, the **H. G. Sherwood Company**, manufacturing wagon hubs, the **Fulton Manufacturing Company**, manufacturing clothes-pins and butter dishes, the **Cherry River Extract Company**, manufacturing wood extract, the **William F. Mosser Company**, operating a tannery, and the **Cherry River Paper Company**, engaged in paper manufacture, and all located in the immediate vicinity of Richwood, have already been described in detail under the general account of the city of Richwood, pages 13-16.

The **West Virginia Timber Company**, having its head office at Charleston, W. Va., and its mill at Vaughan, on Twentymile Creek, where it is served by the Chesapeake and Ohio Railway, was established in 1904. According to N. Moore, Superintendent, the company manufactures both rough and dressed lumber, the by-product of the slabs being made into chair stock. The mill is of the double-band type, with a capacity of 60,000 ft. B. M. daily, 40 men being employed at the mill and yard, of whom 16 are skilled laborers, and 16 men being required to operate the railroad. The timber is cut by contract, requiring the services of 40 additional men.

The **Flynn Lumber Company**, having its head office and works at Swiss, located at the mouth of Little Elk Creek, where it is served by its own railroad tributary to the Chesapeake and Ohio Railway at Belva, was established in 1905 and manufactures rough lumber. According to T. F. Kerr, office man, the mill is of the single-band type, with a rated capacity of 50,000 ft. and an output of 40,000 ft. B. M. daily, 80 men being employed at the mill of whom 15 are skilled laborers. In the woods and on the railroad 175 additional men are required.

The **Davis-Eakin Lumber Company**, having its plant at Skyles on Birch River at the Webster-Nicholas County Line,



PLATE XXXII. — Virgin hemlock timber on Jerry Fork of Hominy Creek, 2 miles southeast of Mt. Nebo, with rhododendron undergrowth.

Photo by E. E. Harris.

has already been described in the Webster Report of the Survey, pages 534-5.

The **Birch Valley Lumber Company**, successor to the Tioga Lumber Company, and having its head office and works at Tioga, on the waters of Beaver Creek where it is served by the Strouds Creek & Muddlety Railroad, tributary to the Baltimore and Ohio Railroad at Allingdale, was organized in 1915 and principally manufactures rough lumber, there being a planer and resaw equipment at the plant. According to J. C. Campbell, Treasurer, the mill is of the double-band type, with a capacity of 80,000 ft. B. M. daily, there being 100 men employed in the mill and yard.

The **Pardee & Curtin Lumber Company**, having its head office at Curtin on the Baltimore and Ohio Railroad at the mouth of Cherry River, operates three mills in Nicholas County, together with 50 to 60 miles of three-foot gauge railroad track, there being 100 men employed on the railroad and 250 cutters in the woods, according to H. B. Curtin, Assistant Treasurer. The **Curtin Mill**, located at Curtin, was built in 1900, and manufactures all common varieties of West Virginia hardwood and hemlock lumber, being of the double-band type, with a daily capacity of 80,000 to 100,000 ft. B. M., and employing 100 men. The **Coal Siding Mill**, located at Coal Siding on the west side of Cherry River above Curtin, where it is served by the Baltimore and Ohio Railroad, was established in 1903, and manufactures hardwood lumber, being of the single-band type, with a daily capacity of 40,000 ft. B. M., and employing 50 men. The **Hominy Mill**, located at Hominy Mill on Hominy Creek, where it is served by the company railroad tributary to the Baltimore and Ohio at Curtin, was established in 1909 and manufactures hardwood lumber, being of the double-band type, with a daily capacity of 80,000 feet B. M., and employing 100 men.

CHAPTER XII

CLAY, LIMESTONE, BUILDING STONE, AND ROAD MATERIAL.

CLAYS AND CLAY INDUSTRY.

PRESENT DEVELOPMENT.

Little attempt has been made to utilize the clays of Nicholas County. A small brick plant was formerly operated at the town of Summersville but was finally abandoned, and recently another has been built near the same town, but elsewhere in the county no clay products have been manufactured.

Walker Brothers Brick Plant.--The Walker Brothers Brick Plant, now abandoned, was located just north of the Summersville and Slaven Cabin Road near the eastern end of Summersville, having been devoted to the manufacture of common building brick for local use. No details of the plant are now available but the old quarry may still be seen, its extent having been about 150 feet long by 5 to 10 feet deep and 25 feet into the gently sloping hill. The material is evidently a residual clay, mainly derived from the soft shales coming a few feet above the top of the Lower Gilbert Sandstone ledge and just above the Lower War Eagle Coal which outcrops at the roadside near the plant. The brick burned to a pale-red color, indicating a small percentage of iron.

Brock and Horan Brick Plant.—The Brock and Horan Brick Plant, established in 1917, with headquarters at Summersville and works on Arbuckle Branch of Muddlety Creek, just southeast of the town, is engaged in the manufacture of building brick and drainage tile, its kiln capacity being rated at 20,000 brick or 18,000 to 20,000 feet of tile, according to C. H. Brock. The equipment consists of an American Clay Manufacturing Company Pug Mill and Brick Machine, 1 drying shed and 1 circular updraft kiln of 24 feet diameter, burning wood and coal, the time required for burning brick being 20 days and for tile 4 days. The quarry, which has been excavated to a depth of 10 feet, shows a clay that is sandy at top and white at base, being evidently of mixed terrace and residual origin, a type that is common throughout the Muddlety Creek Valley. A sample (No. 356R) was collected across the face of the quarry, its analysis showing the following composition, according to Messrs. Hite and Krak:

	Per cent.
Silica (SiO_2).....	74.83
Ferric Iron (Fe_2O_3).....	3.74
Alumina (Al_2O_3).....	11.48
Lime (CaO).....	0.43
Magnesia (MgO).....	0.73
Potassium (K_2O).....	2.00
Sodium (Na_2O).....	0.65
Titanium (TiO_2).....	1.94
Phosphoric Acid (P_2O_5).....	Trace
Moisture	1.09
Loss on ignition.....	3.70
Total	100.59

No brick or tile had yet been burned at the time of the writer's visit but the analysis would indicate a red product, due to the iron, and a brick that would probably be more suitable for buildings than for paving or refractory purposes, as the alkalis and other fluxing ingredients would seem to preclude it from the latter use. As drainage tile it should prove very satisfactory.

AVAILABLE CLAY AND SHALE.

Transported Clay.

Along the flood-plains of Birch and Gauley Rivers, as well as on some of the smaller streams, there are large deposits of river clay, varying in thickness from 5 to 15 feet, that are suitable for common building brick, such as will be greatly needed when the increasing cost of lumber will preclude its use for residential purposes. These deposits are indicated as Alluvium on Map II, where the principal areas may be noted. In addition to these flood-plain deposits there are large areas of white terrace clay on the various tributaries of Gauley River, mainly north of the Summersville and Slaven Cabin Road and northeast of Summersville, their presence being much in evidence along Muddlety Creek. Many of these deposits are listed in Chapter II, under the subject of "River Terraces", pages 85-90. These clays would be suitable for brick or drainage tile and should be of much local value. A sample collected in the public road along Muddlety Creek, 0.6 mile southwestward from Hookersville, on the land of G. W. and J. H. Craig, where 10 feet of white clay is exposed, coming 10 feet above creek level, shows the following analysis, according to Messrs. Hite and Krak:

	Per cent.
Silica (SiO_2).....	84.34
Ferric Iron (Fe_2O_3).....	1.60
Alumina (Al_2O_3).....	7.87
Lime (CaO).....	1.45
Magnesia (MgO).....	0.05
Potassium (K_2O).....	1.12
Sodium (Na_2O).....	0.43
Titanium (TiO_2).....	0.01
Phosphoric Acid (P_2O_5).....	0.06
Moisture	0.48
Loss on ignition.....	2.83
Total	100.24

The low ferric iron content (1.60 per cent.) of the above sample would indicate a clay that might be white-burning, and it is much to be regretted that a physical test of this important item is not available, as it would seem that the clay might be suitable for some kinds of pottery ware, although the content of alumina is somewhat low. The low content of alkalies is also a favorable feature, making it seem probable that further tests of these extensive deposits along Muddlety Creek would be amply justified.

Residual Clay.

Residual clay, which is derived from weathered rocks and shale, and is still in its original location, is not of sufficient importance to be classed as a building material in Nicholas, except in isolated localities, a very considerable portion of it having been washed down the mountainsides to the river valley below. Whatever of these deposits still remain in place should rather be classed as soil, more valuable for agricultural than for other purposes.

Stratified Shales.

Stratified shales, composed principally of silica and alumina, and lying between the sandstone ledges of the Allegheny and Pottsville Series, which crop throughout Nicholas, compose a considerable portion of the surface rocks of the county. Nearly all of these shales are of material that could be made into brick of some sort, some of it being suitable for paving purposes, while others would make nothing better than common building brick. In the southeastern corner of the county the red shales of the Mauch Chunk Series crop along the South Fork of Cherry River, there being a thick bed just below the Princeton Conglomerate. These red shales, as approximately shown on Map II, constitute a large supply of brick or tile material which could be quarried at low cost. Their iron content insures that they would burn to a rich red color of pleasing tone. It is probable that as paving brick they would not prove as durable as some of the fire clay

shales of the northern counties of the State, but their low cost would seem to justify their use for this purpose locally if used on a concrete sub-grade which would tend to reduce to a minimum the crushing effect of vehicular traffic. In addition to the low cost of first construction the use of such local material is often justified by the fact that such a course keeps money at home while the use of outside material, even if of somewhat better grade, tends to drain the county of its financial resources.

The shales of the Allegheny Series have been described in Chapter V, those of the Kanawha Group of the Pottsville in Chapter VI, and those of the New River Group in Chapter VII, and in Chapter IV there are numerous measured sections showing their thickness and physical character at various localities in the county, to which the reader is referred.

Fire Clay.

High-grade refractory fire clays of commercial thickness and purity were not observed in Nicholas, the various horizons that contain them in the northern counties of the State being occupied mainly by sandy shales. Impure fire clay shales occur just beneath many of the coal beds, but they do not appear to be of value.

LIMESTONE.

SCARCITY OF DEPOSITS.

The surface rocks of Nicholas contain no limestone deposits of consequence. Sandy or ferruginous nodules occasionally appear in many of the shales but their principal economic function is that of soil enrichment. In Jefferson District a thin calcareous stratum was observed at the horizon of the Seth Limestone, the same having been noted in the section for Panther Mountain, page 118, the analysis of the same having been published under the description of this horizon on page 263. This deposit contains a considerable percentage of silica which would preclude its use for most purposes.

BUILDING STONE.

QUARRIES.

In Chapters V to VIII, inclusive, the various sandstone quarries found in Nicholas have been classified under their respective geologic names, there being only a few small quarries in the county, most of which are located in the vicinity of Summersville, while at scattered points others have been opened to secure stone for railroad abutments. Under the next heading, entitled "Available Stone", will be found a list containing not only the quarry horizons previously noted, but also the entire list of sandstone ledges suitable for masonry or concrete material.

AVAILABLE STONE.

The sandstones of Nicholas, as described in detail in preceding Chapters, vary from flaggy and shaly beds that do not have the necessary cohesiveness to be used for building stone, to great massive ledges, 75 to 150 feet thick, that may be split into building blocks of any desired size. In the Allegheny and Pottsville Series these massive ledges are all much of the same type, micaceous, gray on fresh fracture, often weathering to brown, some of them being soft and worthless while others are hard and durable. Most of them do not have the beauty of texture and smoothness of grain to make them desirable for architectural purposes where ornamental or carved effects are desired, there being certain exceptions, as previously mentioned under the various stratigraphic descriptions. In all structures, however, where durability and fire-proof construction are the main features desired, they can not be surpassed by any stone shipped in from other counties or States. They are fitted for bridge piers and abutments, retaining walls, and for buildings of plain construction, and will doubtless be largely used when the mining industry of the county is fully developed. Many of these outcroppings have been described in detail in the Chapters on Stratigraphy.

In the Mauch Chunk Series, which crops only on South Fork of Cherry River above Richwood, the sandstone ledges, as a rule, are flaggy, shaly, and micaceous, the Princeton Conglomerate, which comes 50 to 100 feet below the top of the Series, being a notable exception to this rule. This great ledge is massive and conglomeratic, often approaching a quartzite, and being so extremely tough that it can scarcely be successfully quarried. It would seem to be well suited, however, for concrete aggregate or macadam.

The following table gives a list of the principal sandstone ledges that would prove suitable for quarrying or for concrete and macadam, those printed in full-faced type having already been used for masonry construction in the county:

Table of Sandstones Available for Masonry Construction.

Name of Sandstone	Geological Series	Approximate Thickness Feet	Page on which Described.
Upper Mahoning.....	Conemaugh.....	30 to 40	188
Lower Mahoning.....	Conemaugh.....	30 to 40	189
Upper Freeport.....	Allegheny.....	50 to 80	193-5
Lower Freeport.....	Allegheny.....	20 to 50	196-7.
Upper East Lynn.....	Allegheny.....	30 to 50	198
East Lynn.....	Allegheny.....	25 to 45	199
Homewood.....	Pottsville (Kanawha Group) ..	50 to 80	212-13
Upper Coalburg.....	Pottsville (Kanawha Group) ..	20 to 30	241-2
Lower Coalburg.....	Pottsville (Kanawha Group) ..	10 to 25	246
Upper Winifrede.....	Pottsville (Kanawha Group) ..	10 to 30	246
Upper Chilton.....	Pottsville (Kanawha Group) ..	20 to 30	250-1
Lower Chilton.....	Pottsville (Kanawha Group) ..	5 to 20	251-2
Hernshaw.....	Pottsville (Kanawha Group) ..	10 to 35	252
Upper Cedar Grove.....	Pottsville (Kanawha Group) ..	10 to 40	262-3
Peerless.....	Pottsville (Kanawha Group) ..	10 to 30	267-8
Monitor	Pottsville (Kanawha Group) ..	10 to 20	269-70
Brownstown.....	Pottsville (Kanawha Group) ..	20 to 40	273
Eagle.....	Pottsville (Kanawha Group) ..	10 to 20	278
Decota.....	Pottsville (Kanawha Group) ..	10 to 40	280
Lower Gilbert	Pottsville (Kanawha Group) ..	30 to 60	289-92
Dotson	Pottsville (Kanawha Group) ..	20 to 40	293-4
Lower Dotson.....	Pottsville (Kanawha Group) ..	20 to 50	302
Lower Nuttall.....	Pottsville (New River Group) ..	75 to 110	315-16
Harvey.....	Pottsville (New River Group) ..	10 to 30	326
Guyandot.....	Pottsville (New River Group) ..	20 to 50	331
Lower Guyandot.....	Pottsville (New River Group) ..	10 to 30	325-6
Upper Raleigh (Sharon).....	Pottsville (New River Group) ..	50 to 75	340-1
Princeton Conglomerate.....	Mauch Chunk.....	50 to 100	354

ROAD MATERIAL.

RIVER AND CREEK GRAVEL.

Attention has been called in many previous Reports of the Survey to the fact that most of the rivers and creeks of the State contain an abundant supply of gravel, which, being the more resistant portions of the rocks from which they came, afford good material for improving roads that is often cheaper than any other that can be secured. The roads often follow the streams closely, making it possible to macadamize with gravel at much less cost than with stone quarried from the hills. This general statement holds true over most of northern Nicholas where the main roads are in the valleys, and where there is an abundance of gravel, but in the plateau region south of Gauley, where travel is largely confined to the ridges, the use of gravel would be more costly.

SAND.

Sand, which is another essential material needed in road building, both in masonry construction and in concrete, is found generally along the rivers and principal creeks of Nicholas, and as it is mostly derived from the coarse sandstones of the Allegheny and Pottsville Series, it is usually sharp and reasonably free from organic accumulations.

NEAREST LIMESTONE DEPOSITS.

As stated on a previous page, no limestone of economic importance outcrops in Nicholas. There are, however, great deposits of this desirable road material in the Greenbrier Valley in Summers and Greenbrier Counties, transportation from which to the western end of Nicholas County is afforded by the Chesapeake and Ohio Railway. If transportation should ever be provided to the upper Elk River Valley of Webster, Randolph, and Pocahontas Counties, as seems entirely probable, the large deposits of that region would also become available for use in the eastern end of Nicholas. It is also true that immediately southeast of Nicholas there are further large

deposits in Greenbrier and Pocahontas Counties, but the great mountain range that separates the waters of Gauley River from those of the Greenbrier forms an effectual barrier against any probable means of transporting them directly to the county.

BRICK MATERIAL.

As above stated under the heading of "Stratified Shales" there is an abundance of material that can be made into brick, some of which would probably be durable enough to answer local purposes for road pavement, provided a sub-grade of concrete be built to carry part of the shock of traffic.

SANDSTONE FOR MASONRY, MACADAM AND CONCRETE.

Under the heading "Available Stone" pages 747-8 there is given a discussion of the merits of the various sandstone ledges of the county, as well as a table of reference to the detailed descriptions of the beds on previous pages. In almost every portion of the county there may be found one or more outcropping ledges that can be used for massive masonry construction, as well as for concrete aggregate. While it is true that sandstone is not an ideal material for macadam, certain of the more resistant ledges, such as the Homewood and Lower Gilbert of the Kanawha Group, the Lower Nuttall, Guyandot, and Lower Guyandot of the New River Group, and the Princeton Conglomerate of the Mauch Chunk Series, could profitably be used for local macadam, because of the low first cost.

PART IV.

Paleontology.

CHAPTER XIII.

NOTES ON THE PALEONTOLOGY OF NICHOLAS COUNTY

INVERTEBRATE FOSSILS FROM THE POTTSVILLE SERIES.

By W. Armstrong Price.

INTRODUCTION.

The summer of 1917 was spent in assisting Mr. D. B. Reger in studying the geology and economic resources of Nicholas County in the field and in collecting with his assistance from the several fossiliferous beds discovered during the progress of the work. The laboratory studies of the fossils were begun during the winter of 1917 and were resumed in 1920. Thanks are due to Mr. Reger for his assistance in collecting fossils and to Dr. George H. Girty whose collections have been available for the comparison of new and doubtful forms.

FAUNAL HORIZONS.

The stratified rocks which outcrop in Nicholas County are of Quaternary, Pennsylvania, and Mississippian ages. As shown by Reger in Chapter IV, alluvial deposits of Pleistocene age are found along certain river terraces but are not known to contain fossils.

The youngest formation of the Pennsylvanian System remaining in Nicholas County is the Conemaugh Series, the lower portion of which is found on the tops of the higher hills in the northern and northwestern portions of the county. A maximum thickness of about 300 feet of Conemaugh strata remain in the county. The fossiliferous members of the Conemaugh lie above these beds and have been carried away by erosion, except at a few isolated points. No fossils, however, were observed in these localities.

The Allegheny Series is represented by 300 to 350 feet of strata which outcrop over a considerable area of northern and northwestern Nicholas. No animal fossil remains were observed in this series in the county, and, with this exception of the Vanport Limestone fauna of the "Northern Panhandle" area of West Virginia and one isolated occurrence of brackish water shells over the Lower Kittanning Coal in Barbour County, no fossils have been found in the Allegheny Series in this State.

Strata of Pottsville age cover most of the surface area of the county. The entire thickness of the Kanawha and New River Groups is exposed in the county and 235 feet of strata of the Pocahontas Group have been identified by Reger from the records of borings at Deepwell. The Pocahontas Group does not outcrop in Nicholas County.

Fossils have been found in Nicholas County in eight members of the Kanawha Group. As the strata of this series are followed northeastward from the valley of the Great Kanawha River into and across Nicholas County many become gradually reduced in thickness and others vanish. A few new beds appear. The marine faunas become fewer in number and contain fewer species. Certain new species appear in Nicholas

County and marine faunas of a restricted type become common. Certain faunal assemblages which may have had a brackish-water habitat also appear and become abundant.

Four of the seven fossiliferous beds which normally carry marine faunas to the west and southwest in the counties of Kanawha, Boone, Raleigh, and Wyoming also contain marine faunas in Nicholas County. These are: The Kanawha Black Flint, Winifrede Limestone, Dingess Shale, and Eagle Shale horizons. Only two of these faunas have been traced north-eastwardly into Webster County.

The New River Group of the Pottsville Series is represented by a maximum of about 800 feet in Nicholas County. Few animal fossils were found in this group although several members have yielded restricted marine and brackish-water faunas in Webster and other counties, their occurrence in Nicholas being apparently restricted to the roof shales of the Sewell Coal.

The following table, adapted from the general section of the Pottsville Series by D. B. Reger, given in Chapter VI of this report, exhibits the relationships and geologic position of the fossiliferous members of the Pottsville Series found in Nicholas County. The correlations are based chiefly upon stratigraphic data, no rigid paleontological correlation of the faunules of the Pottsville being warranted by the data in hand. The maximum intervals correspond most closely with thicknesses in the central and southern portions of the county, as there is a considerable thinning toward the north and north-east:

**General Section of the Pottsville Series for Nicholas County
Showing Fossiliferous Members.**

	Thickness.	Total.
	Feet.	Feet.
Kanawha Group (1200')		
Homewood Sandstone, prominent in northern portion of county.....	50 to 88	88
Interval	67	155
Kanawha Black Flint horizon (Mercer Limestone of Pennsylvania?) dark shale with marine fossils in northeastern part of county; black to gray chert along north-		

	Thickness. Feet.	Total. Feet.
western boundary.....	2 to 5	160
Interval	45	205
Coalburg Shale , black, argillaceous, with a restricted marine fauna on Birch River...	0 to 5	210
Coalburg Coal	2 to 10	220
Quakertown Shale (supposed position); contains restricted marine fauna in Randolph County	0 to 9	229
Interval	96	325
Winifrede Limestone , nodular, often represented only by dark shale, both fossiliferous in places; both marine and restricted marine assemblages in northern part of the county.....	0 to 5	330
Interval	150	480
Dingess Shale , dark, sandy or ferruginous, containing marine fossils in the extreme western corner of the county and restricted marine faunas in the northern central portion.....	0 to 6	486
Interval	205	691
Roof Shale of Campbell Creek Coal (No. 2 Gas Bench) , weathered soft, brown, containing a brackish-water fauna on McMillion Creek.....	4	695
Interval	72	767
Stockton ("Cannelton") Limestone , siliceous, lenticular, usually represented by black shale; carries a brackish (?) water fauna on McMillion Creek.....	0 to 2	769
Interval	131	900
Eagle Limestone and Shale , containing marine fossils west of the center of the county; restricted marine and brackish (?) water faunas in the central region:		
1. Shale, black, laminated, with iron ore concretions, fossiliferous.....	10 to 24	924
2. Limestone, hard, dark, lenticular, fossiliferous	0 to 1	925
3. Shale, black, laminated, with iron ore concretions; fossiliferous.....	5 to 9	934
Interval	126	1060
Gilbert Shale , dark, laminated, siliceous, reported by Reger to be fossiliferous at Swiss, no collection obtained.....	0 to 10	1070
Interval	115	1185
Douglas Shale , dark, sandy, laminated; contains brackish-water fossils near Persinger Ford	5 to 13	1198
Lower Douglas Coal	1 to 2	1200
New River Group (800')		
Interval	800	2000
Pocahontas Group (235') (noted in borings at Deepwell)		
Interval, to red shale of the Mauch Chunk Series	235	2235

THE FAUNAS.

Marine Faunas.—Following the usage of a former report the marine faunas of the fossiliferous horizons recognized in Nicholas County will be classified as **marine** faunas and **restricted marine** faunas.

Restricted Marine Faunas.—The restricted marine faunas are meager faunas which seldom contain more than a half-dozen species and these are chiefly hardy and simple types. Eighteen forms have been listed as found in these restricted faunas and two species are added in this report. About one-third of the restricted species are found among the so-called "immortal" and "persistent" types of Reudemann². The remainder are chiefly pelecypoda and small gastropoda. The common Pennsylvanian brachiopod genera **Schizophoria**, **Derbya**, **Productus**, **Pustula**, **Marginifera**, **Spirifer**, **Spiriferina** and **Composita** which are found in abundance in marine faunas in the Appalachian province are conspicuously absent, as are also most of the common genera of pelecypoda and gastropoda. The restricted faunas are in many cases associated with plant fragments and in other cases with well-preserved plant leaves.

Two species not included in the previous list; namely, **Lingula lemniscata** Price, known only from the Pottsville Series of West Virginia, and **Echinocrinus exilis** sp. nov., were found in Nicholas County in such a restricted fauna. The complete list of these restricted forms, as now known, follows:³

¹West Virginia Geological Survey, Report, Webster County, 1920.

²Reudemann, R., New York State Museum, 1917, Bull. No. 196, tables pp. 108-115.

³The objects noted in the former report as "Gastropod shell fillings" and included in the above list, are probably of mechanical origin, although in some cases they seem to have been formed around fragments of shells of gastropods and other organisms.

<i>Spirorbis pusillus</i> (Martin)	Genus "immortal."
<i>Echinocrinus exilis</i> sp. nov.	
<i>Lingula carbonaria</i> Shumard	Genus "immortal."
<i>Lingula kanawhensis</i> Price	Genus "immortal."
<i>Lingula lemniscata</i> Price	Genus "immortal."
<i>Orbiculoidea capuliformis</i> (McChesney)	Genus "persistent."
<i>Orbiculoidea missouriensis</i> (Shumard)	Genus "persistent."
<i>Myalina perniformis</i> Cox	
<i>Naiadites elongata</i> Dawson	
<i>Schizodus affinis</i> Herrick.	
<i>Aviculipecten rectilaterarius</i> Cox	Genus "persistent."
<i>Deltopecten flabellum</i> Price	
<i>Allerisma guyandotensis</i> Price	
<i>Plagioglypta meekiana</i> (Geinitz) ?	
<i>Aclisina stevensiana</i> (Meek and Worthen)	
<i>Aclisina conditi</i> Mark ?	
Crustacean (?) remains	
Ostracoda	Many ostracod genera "persistent."
Fish scales	
Planta	

Non-Marine (?) or Brackish-Water (?) Faunas.—At many localities the only shells found are those of *Naiadites elongata* Dawson which are in some cases associated with abundant plant remains including well-preserved leaves of delicate construction. It is probable that these shells inhabited lagoons bordered by forests. The waters of the lagoons may or may not have been less salty than that of the open ocean. It seems likely that in some cases at least such lagoonal waters would have been brackish. In some cases *Spirorbis* and ostracods are added to the above association. It is probably nearer the truth to regard these assemblages as of the brackish-water (lagoonal) type rather than as having had a fresh-water habitat.⁴ *Naiadites* is considered by some⁵ as commonly having a fluvial or lacustrine habitat.

The composition of the various faunules of Nicholas County will now be presented in detail:

Kanawha Black Flint.—At seven localities fossils were found in strata which have been referred to this horizon. At four of these; namely, Localities Nos. 146, 152, 163, and 167,

⁴The so-called "fresh-water faunas" noted in the Webster County Report, referred to above, should probably be considered brackish-water faunas.

⁵Dall, in Eastman-Zittel, Textbook of Paleontology, 2nd Ed., 1913, Vol. 1, p. 451.

normal marine assemblages appear, which, however, contain eight of the forms common in the restricted faunas. The species noted at these localities are as follows:

Clionolithes canna Price
Lingula carbonaria Shumard
Lingula kanawhensis Price
Lingula lemniscata Price
Orbiculoidea capuliformis (McChesney)
Derbya crassa (Meek and Hayden)
Chonetes granulifer Owen
Productus semireticulatus Martin
Spirifer boonensis Swallow ?
Solenomya radiata Meek and Worthen
Edmondia ? sp.
Naiadites elongata Dawson
Schizodus ulrichi Worthen ?
Schizodus cuneatus Meek ?
Schizodus sp.
Deltopecten flabellum Price
Deltopecten sp. A
Allerisma terminale Hall
Astartella concentrica (Conrad)
Bellerophon crassus Meek and Worthen?
Sphaerodoma primigenia Conrad
 Gastropoda (immature)
Conularia crustula White ?
 Fish scales
 Planta

At Locality 143 only *Orbiculoidea capuliformis* (McChesney) was found. This may be listed as a restricted marine fauna. Since only 2½ feet of shale was exposed at this place the main portion of the fossiliferous bed may not have been seen.

At Localities Nos. 159 and 168 only *Naiadites elongata* Dawson was found and the "fauna" may be provisionally classified as of brackish-water origin. It is possible that the marine fauna of this horizon was prevented from reaching these two localities while the hardy *Naiadites* succeeded in crossing a barrier into a more or less isolated basin. It is also possible that the fossiliferous shales are not at the horizon of the Kanawha Black Flint.

Coalburg Shale.—A single specimen of *Orbiculoidea capuliformis* (McChesney) was collected at locality 166 by Reger. This is recorded as a restricted marine fauna.

Winifrede Limestone.—The three collections made from strata referred to the horizon of the Winifrede Limestone all contain marine species. At Locality 144 were found *Lingula kanawhensis* Price and *Naiadites elongata* Dawson. At Locality 153 were found *L. kanawhensis* and *Deltopecten fiabellum* Price. These faunas are, therefore, of the restricted marine type. At Locality 147 were found five species from the list of restricted marine forms with plant remains and *Composita subtilita*, *Solenomya radiata* and *Deltopecten* sp.⁶ This assemblage shows a close relationship to the restricted marine type and appears to represent a remote outpost of the normal marine species in an unfavorable habitat. The complete list of species obtained at the three localities follows. Examples of all these species were found in the collection from Locality 147.

Lingula carbonaria Shumard
Lingula kanawhensis Price
Lingula lemniscata Price
Orbiculoidea capuliformis (McChesney)
Composita subtilita (Hall)
Solenomya radiata Meek and Worthen
Naiadites elongata Dawson
Deltopecten sp. Price (Wyoming County)
 Planta

Dingess Shale.—A normal marine collection containing a rather full Pottsville fauna was obtained at Locality 151. The collection from Locality 162, which contains *Productus nodosus* Newberry in addition to *Orbiculoidea capuliformis*, is also marine in type. The list of species from these two localities follows:

Clionolithes canna Price
Serpulites sagittifer Price
Spirorbis pusillus (Martin)
Echinocrinus exilis sp. nov.
Lingula kanawhensis Price
Lingula lemniscata Price
Orbiculoidea missouriensis (Shumard)
Orbiculoidea capuliformis (McChesney)
Schizophoria resupinoides (Cox)?

⁶West Virginia Geological Survey, Report on Raleigh and Western Portion of Summers and Mercer Counties, 1916, p. 722, pl. xxxi, figs. 7 and 8.

Derbya crassa (Meek and Hayden)
Chonetes granulifer Owen
Productus semireticulatus (Martin)
Productus nodosus Newberry
Spirifer boonensis Swallow ?
Solenomya radiata Meek and Worthen
Solenomya sp.
Edmondia gibbosa (M'Coy)
Naiadites elongata Dawson
Schizodus cuneatus Meek ?
Schizodus sp.
Deltopecten flabellum Price
Deltopecten sp. A
Streblopteria tenuilineata Meek and Worthen
Allerisma terminale Hall
Astartella concentrica (Conrad)
Patellostium montfortianum (Norwood and Pratten)
Aclisina stevensiana (Meek and Worthen)
Conularia crustula White ?
 Fish scales
 Planta

This list includes eleven of the fourteen "restricted marine" species which have been found in Nicholas County.

Five localities have yielded restricted faunas which have been correlated with the Dingess Shale. These are Localities 148, 154, 155, 161, and 164. At three of these *Deltopecten flabellum* is a very conspicuous form. The list follows:

Spirorbis pusillus (Martin)
Echinoocrinus exilis sp. nov.
Lingula kanawhensis Price
Lingula lemniscata Price
Orbiculoidea capuliformis (McChesney)
Naiadites elongata Dawson
Deltopecten flabellum Price
 Fish scales
 Planta

Roof Shale of the No. 2 Gas Coal.—*Naiadites elongata* and plant remains were found at Locality 157 which has been referred to the shales immediately overlying the No. 2 Gas Bench of the Campbell Creek Coal, according to the correlation adopted by Mr. Reger. This shale may be considered as having been deposited in a lagoon or in a related body of brackish water.

Stockton (Cannelton) Limestone Horizon.—At Locality 160 was found *Naiadites elongata*. This collection is tentatively regarded as of brackish-water origin.

Eagle Shale.—Two localities, Nos. 149 and 150, yielded abundant marine fossils containing the largest number of species from any of the horizons recognized in Nicholas County. In addition to these *Spirorbis pusillus* and *Naiadites elongata* were found at Locality 156, which may be termed a restricted marine fauna and *Naiadites elongata* alone at Locality 158, which may be regarded as probably of brackish-water origin, although both collections may have come from beds deposited in brackish water. The list of fossils from Localities Nos. 149 and 150 follows:

Clionolithes canna Price
 Crinoidea, column segments
Lingula lemniscata Price
 Orbiculoidea missouriensis (Shumard)
 Orbiculoidea capuliformis (McChesney)
Schizophoria altirostris (Mather)
Schizophoria resupinoides (Cox)?
Derbya crassa (Meek and Hayden)
Chonetes granulifer Owen
Productus semireticulatus (Martin)
Productus nodosus Newberry
Marginifera wabashensis (Norwood and Pratten)
Spirifer boonensis Swallow ?
Composita subtilita (Hall)
Solenomya radiata (Meek and Worthen)
Edmondia pottsvilliana sp. nov.
Leda meekiana Mark
Parallelodon sp.
Conocardium nicholasensis sp. nov.
Deltopecten sp. A.
Astartella concentrica (Conrad)
Phanerotrema grayvillense (Norwood and Pratten)
Plagioglypta meekiana (Geinitz)
Schizostoma catilloides (Conrad)
Conularia crustula White ?
 Nautiloidea indeterminata
Griffithides scitulus (Meek and Worthen)
 Ostracoda ??
 Planta



Photo by E. E. Harris.
PLATE XXXIII. — Eagle Shale (Locality 149) along Peters Creek road, 1.1 miles northwest of Summersville; sandstone ledge just beneath hammer is principal fossiliferous zone; large block of this ledge stands in center below toad which had secured winter quarters in a crevice.

Douglas Shale.—At Locality 142 were found shells of *Naiadites elongata* and plant remains, denoting a brackish-water origin.

Summary of Faunal Characteristics.—The Kanawha Group of the Pottsville Series in Nicholas County is seen to contain marine faunas at four horizons—the Kanawha Black Flint, the Winifrede Limestone, the Dingess Shale, and the Eagle Shale, according to the correlation presented in the accompanying report by Mr. Reger. All of these faunas contain in appreciable numbers species which compose the so-called “restricted marine” faunas in addition to the more abundant normal marine species. At other localities are found strata which are correlated with these marine beds but which contain only restricted marine assemblages. One horizon, the Coalburg Shale, contains only a restricted marine fauna and three members—the Roof Shale of the No. 2 Gas Bench of the Campbell Creek Coal, the Stockton Limestone and the Douglas Shale—contain faunas which may be of brackish-water origin. Brackish-water faunas may also be provisionally recognized at localities referred to the Kanawha Black Flint and the Eagle Shale.

The accompanying map (Figure 22) shows the character of the fauna at each fossil locality. As is indicated on the map, there is a central area of somewhat irregular extent within which appeared throughout Kanawha time, so far as is now known, only restricted marine or brackish-water species. While the number of collections from the different beds is small and there are large areas from which no collections have been made, yet the data at hand appear to be sufficient to indicate that within this central area conditions were probably unfavorable to the entrance of the normal type of marine invertebrates. Outside of this area in Nicholas County and

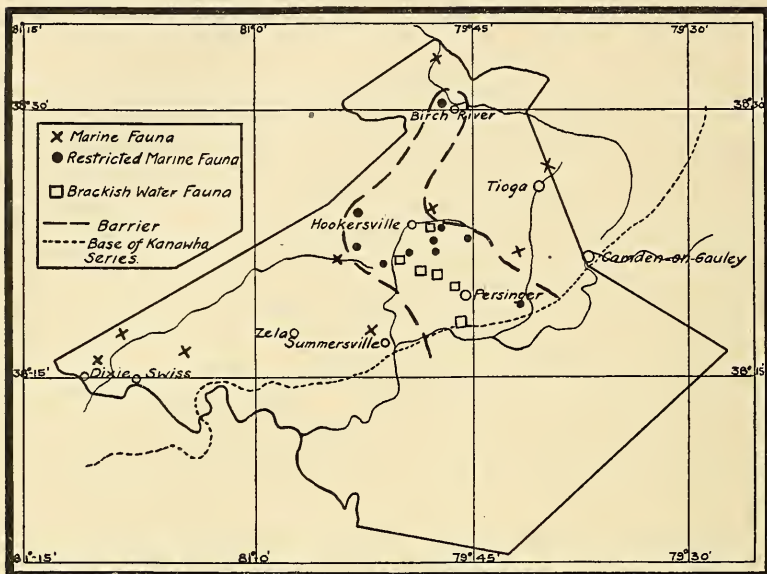


Figure 22.—Map of Nicholas County, showing fossil localities with the habitat of the fauna indicated by symbols. Dotted line shows base of Kanawha Group. Broken line shows approximate position of a barrier and outlines an area of restricted faunas which at times was partly or wholly covered by brackish waters.

within the area now underlain by strata of Kanawha age marine species appeared and no collections of restricted assemblages have been obtained. Throughout the area now occupied by the Kanawha sediments the species of the restricted assemblages ranged and mingled with the marine species, returning with successive incursions of the waters. At each return of the waters the marine species appear to have been halted at the boundary of this central area.

The following table presents a summary of the faunal types recognized in each horizon and at each locality where collections were obtained. The numbers refer to localities:

HORIZONS	FAUNAL TYPES		
	Marine	Restricted Marine Localities	Brackish Water
Kanawha Black Flint	146 152 163 167	143	159(?) 168(?)
Coalburg Shale		166	
Winifrede Limestone	147	144 153	
Dingess Shale	151 162	148 154 155 161 164	
Roof Shale of No. 2 Gas Coal			157
Stockton Limestone			160(?)
Eagle Shale	149 150	156	158(?)
Douglas Shale			142

Range and Distribution of Fossils—Kanawha Group

	Kanawha Black Flint							Coalburg Shale
	143	146	152	159	163	167	168		166
<i>Clionolithes canna</i>	x	..	..	..	..	..	..
<i>Serpulites sagittifer</i>
<i>Spirorbis pusillus</i>
Crinoidea, column segments.....
<i>Echinoerinus exilis</i> sp. nov.....
<i>Lingula carbonaria</i>	c	a	..	..	..	..	..
<i>Lingula kanawhensis</i>	c	x	..	..	..	..	..
<i>Lingula lemniscata</i>	e	..	..	..
Orbiculoidea missouriensis.....
Orbiculoidea capuliformis.....	x	c	a	..	x	x	..	x
<i>Schizophoria altirostris</i>
<i>Schizophoria resupinoides</i> ?.....
<i>Derbya crassa</i>	x	..	..	a	x	..	..
<i>Chonetes granulifer</i>	a	..	c	x	..	..
<i>Productus semireticulatus</i>	?	x	..	..
<i>Productus nodosus</i>
<i>Marginifera wabashensis</i>
<i>Spirifer boonensis</i> ?.....	a	x	..	..
<i>Composita subtilita</i>
<i>Solenomya radiata</i>	c	..	..	..	..	..	..
<i>Solenomya</i> sp.....
<i>Edmondia gibbosa</i>
<i>Edmondia pottsvillian</i> sp. nov.....
<i>Edmondia</i> ? sp.....	..	a	..	..	..	..	..	..
<i>Leda meekiana</i>
<i>Parallelodon</i> sp.....
<i>Conocardium nicholasensis</i> sp. nov.....
<i>Naiadites elongata</i>	x	c	..	..	x	..
<i>Schizodus ulrichi</i> ?.....	c	..	..	..	..
<i>Schizodus cuneatus</i> ?.....	..	x	..	..	..	..	..	..
<i>Schizodus</i> sp.....	..	c	..	..	..	..	..	..
<i>Deltopecten flabellum</i>	?
<i>Deltopecten</i> sp.....
<i>Streblopteria tenuilineata</i>
<i>Deltopecten</i> sp. A.....	x	..	..	..	..	..
<i>Allerisma terminale</i>	c	x	..	..	..	..	..
<i>Astartella concentrica</i>	x	..	..	..	..	..	..
<i>Phanerotrema grayvillense</i> ?.....
<i>Plagioglypta meekiana</i>
<i>Bellerophon crassus</i> ?.....	..	x	..	..	..	..	..	..
<i>Patellostium montfortianum</i>
<i>Schizostoma catilloides</i>
<i>Aclisina stevensiana</i> ?.....
<i>Sphaerodoma primigenia</i>	x	..	..	..	..	..	..
Gastropoda (immature).....	..	x	..	..	..	..	..	..
<i>Conularia crustula</i> ?.....	x	..	..	..	..	..
Nautiloidea indeterminata.....
<i>Griffithides scitulus</i>
Ostracoda ??.....
Fish scales.....	..	x	..	..	..	..	..	..
Planta.....	..	x	x	..	..	..	..	..

Register of Localities.

The following list includes the localities in Nicholas County from which fossils have been collected. Several localities from adjoining portions of Webster County are included. Locality 152 on the line between Webster and Nicholas Counties was listed in the Webster County Report, for which a portion of the fossils collected were studied. An asterisk (*) denotes that the collection has been studied for this report:

- 142.* Nicholas County, Hamilton District, in county road 0.5 mile due east of the mouth of Persinger Creek; elevation, 1940 feet (barometer) above sea. Kanawha Group, DOUGLAS SHALE. Collectors, D. B. Reger and W. Armstrong Price.
- 143.* Nicholas County, Hamilton District, prospect in the Stockton Coal on a trail up Paddy Run on the hillside north of of the run; elevation, 2005 feet (barometer) above sea; coal prospect, No. 294 on Map II. Kanawha Group, KANAWHA BLACK FLINT HORIZON. Collector, W. Armstrong Price.
- 144.* Nicholas County, Hamilton District, in county road up the southern end of Powell Mountain; elevation, 1969 feet (hand-level) above sea. Kanawha Group, WINIFREDE LIMESTONE. Collector, W. Armstrong Price.
- 146.* Nicholas County, Beaver District, abandoned coal stripping of J. D. Lambert in Stockton Coal in bed of Back Fork of Beaver Creek, 0.9 mile above mouth of fork and 2.3 miles southwest of the village of Delphi; elevation, 2220 feet (barometer) above sea; farm mine, No. 309 on Map II. Kanawha Group, KANAWHA BLACK FLINT HORIZON. Collectors, D. B. Reger and W. Armstrong Price.
- 147.* Nicholas County, Hamilton District, in small ravine on land of Andrew McCoy in rear of residence at the foot of Powell Mountain, 0.1 mile west of Brushy Fork of Muddlety Creek at a point 1.5 miles above mouth of Spruce Run; elevation, 1920 feet (barometer) above sea. Kanawha Group WINIFREDE LIMESTONE HORIZON. Collectors, D. B. Reger and W. Armstrong Price.
- 148.* Nicholas County, Hamilton District, at foot of hill east of Muddlety Creek on land of G. W. Craig, 1.1 miles northeast of the mouth of McMillion Creek; elevation, 1965 feet (barometer) above sea; coal outcrop, No. 497 on Map II. Kanawha Group, DINGESS SHALE. Collector, W. Armstrong Price.
- 149.* Nicholas County, Summersville District, in county road, east side of valley of Peters Creek, 1.25 miles above mouth of Bryant Branch and 0.1 mile northwest of crossing of road and creek; elevation, 1795 feet (hand-level) above sea. Kanawha Group, EAGLE SHALE. Collectors, D. B. Reger and W. Armstrong Price.
- 150.* Nicholas County, Jefferson District, in county road at head of Otter Creek of Peters Creek, 2.1 miles northwest of the village of Lockwood; elevation, 1350 feet (barometer) above

- sea. Kanawha Group, EAGLE SHALE. Collectors, D. B. Reger and W. Armstrong Price.
- 151.* Nicholas County, Jefferson District, coal prospect in Williamson Coal near foot of hill slope west of Lick Branch of Open Fork of Bells Creek, 0.9 mile east of Cambria; elevation, 1015 feet (barometer) above sea; Coalbell Coal Co. Prospect, No. 480 on Map II. Kanawha Group, DINGESS SHALE. Collectors, D. B. Reger and W. Armstrong Price.
- 152.* Webster County, Glade District, on the line between Webster and Nicholas Counties, in a small, right-hand branch of Barnett Run near the head of the run and 1.8 miles south of Boggs P. O., Webster County; elevation, 2070 feet (barometer) above sea; Tioga Lumber Co. Coal Prospect, No. 311 on Map II. Kanawha Group, KANAWHA BLACK FLINT. Collectors, D. B. Reger and W. Armstrong Price.
- 153.* Nicholas County, Hamilton District, on hillside west of Muddlety Creek on land of J. H. Craig, 0.6 mile southwest of the village of Hookersville; elevation, 1930 feet (barometer) above sea. Kanawha Group, WINIFREDE (possibly DINGESS ?) LIMESTONE HORIZON. Collector, W. Armstrong Price.
- 154.* Nicholas County, Hamilton District, black shale exposed along county road in valley of Muddlety Creek, 0.4 mile northwest of the village of Opal; elevation, 1910 feet (barometer) above sea. Kanawha Group, DINGESS SHALE. Collector, W. Armstrong Price.
- 155.* Nicholas County, Hamilton District, in county road on Muddlety Creek 0.3 mile west of mouth of Enoch Branch and 100 yards southwest of school house; elevation, 1885 feet (barometer) above sea. Kanawha Group, DINGESS SHALE. Collectors, D. B. Reger and W. Armstrong Price.
- 156.* Nicholas County, Beaver District, in county road 1.0 mile southwest of the village of Beaver and 1.3 miles southeast of Burnt Knob; elevation, 2292 feet (hand-level) above sea. Kanawha Group, EAGLE SHALE. Collector, W. Armstrong Price.
- 157.* Nicholas County, Hamilton District, in roof of the farm mine of K. B. McCue about 50 yards north of the county road and about 250 yards northeast of the mouth of the first left-hand branch of McMillion Creek of Muddlety Creek; elevation, 1880 feet (barometer) above sea; farm mine, No. 659 on Map II. Kanawha Group, ROOF SHALE OF THE NO. 2 GAS BENCH OF THE CAMPBELL CREEK COAL. Collector, W. Armstrong Price.
- 158.* Nicholas County, Hamilton District, in county road on right-hand head-prong of Glade Creek of Muddlety Creek and 1.0 mile northwest across the divide from the village of Persinger; elevation, 2000 feet (barometer) above sea. Kanawha Group, EAGLE SHALE. Collector, W. Armstrong Price.
- 159.* Nicholas County, Hamilton District, prospect of G. W. Craig in Stockton Coal at foot of hill east of Muddlety Creek, 0.9 mile northeast of the mouth of McMillion Creek; elevation, 2125 feet (barometer) above sea; coal prospect, No. 292 on Map II. Kanawha Group, KANAWHA BLACK FLINT HORIZON. Collector, W. Armstrong Price.
- 160.* Nicholas County, Hamilton District, in east branch of third left-hand branch of McMillion Creek of Muddlety Creek, in

- private road on land of K. B. McCue, 0.1 mile above mouth of the branch and 2.8 miles above mouth of McMillion Creek; elevation, 1880 feet (barometer) above sea. Kanawha Group, STOCKTON (CANNELTON) LIMESTONE HORIZON. Collector, W. Armstrong Price.
- 161.* Nicholas County, Summersville District, Robinson Fork of Buffalo Creek, 2.0 miles east of Dade, north side of valley; elevation, 1475 feet (barometer) above sea. Kanawha Group, DINGESS LIMESTONE AND SHALE. Collector, D. B. Reger.
- 162.* Nicholas County, Jefferson District, on hillside east of Rockcamp Fork of Twentymile Creek, 0.4 mile south of Greendale; elevation, 920 feet (barometer) above sea; coal exposure, No. 481 on Map II, Kanawha Group, DINGESS LIMESTONE. Collector, D. B. Reger.
- 163.* Nicholas County, Summersville District, on hillside south of Beech Fork of Lilly Fork, 1.1 miles southeast of Dade; elevation, 1850 feet (barometer) above sea; coal exposure, No. 273 on Map II. Kanawha Group, KANAWHA BLACK FLINT HORIZON. Collector, D. B. Reger.
- 164.* Nicholas County, Hamilton District, on hillside south of Hogpen Run of Robinson Fork of Buffalo Creek, 3.8 miles N. 66° W. of Hookersville; elevation, 1280 feet (barometer) above sea; coal prospect, No. 491 on Map II. Kanawha Group, DINGESS LIMESTONE HORIZON. Collector, D. B. Reger.
- 166.* Nicholas County, Hamilton District, on south side of Birch River just west of mouth of Powell Creek and 0.3 mile west of Birch River village; elevation, 1310 feet (barometer) above sea; Mollie Frame farm mine No. 360 on Map II. Kanawha Group, COALBURG SHALE. Collector, D. B. Reger.
- 167.* Nicholas County, Hamilton District, on east side of Birch River, 3.3 miles N. 26° W. of Birch River village and 1.1 miles east of Wade; elevation, 1065 feet (barometer) above sea; John Knabb coal prospect, No. 278 on Map II. Kanawha Group, KANAWHA BLACK FLINT HORIZON. Collector, D. B. Reger.
- 168.* Nicholas County, Hamilton District, on hillside south of Lower Spruce Run of Brushy Fork of Muddlety Creek, 1.1 miles N. 30° W. of Hookersville; elevation, 1890 feet (barometer) above sea; L. M. Atwood farm mine, No. 298 on Map II. Kanawha Group, KANAWHA BLACK FLINT HORIZON. Collector, D. B. Reger.

LOCAL SECTIONS.

The following sections, arranged in descending order, were measured by D. B. Reger and the writer at localities where fossils were collected:

Locality 143. Section measured by the writer at coal prospect No. 294 on Map II:

	Thickness. Ft. In.	Total. Ft. In.
1. Shale, black, Kanawha Black Flint horizon, bearing fossils 2½ feet above its base, the upper portion of the shale being concealed but apparently containing the "blossom" of a coal bed..	4 0	4 0
2. Coal, splinty. 0' 5" } Stockton (Lower		
3. Shale, soft, dark 0 1 } Mercer) Coal; elevation, 2005 feet (barometer) above sea	0 9	4 9
4. Coal, medium-hard. 0 3 }		
5. Shale, base concealed.....		

Locality 144. From the section measured by Reger and the writer along the highway at the south end of Powell Mountain (pp. 148-9) the following portion is taken:

	Thickness. Ft. In.	Total. Ft. In.
1. Sandstone, Upper Coalburg.....	19 0	19 0
2. Concealed	9 0	28 0
3. Shale, black, Coalburg, with plant fossils ("marine?" fossils reported here on p. 148 were obscure objects apparently not organic in origin); elevation, 2012 feet (hand-level) above sea	5 0	33 0
4. Coal, Coalburg; elevation, 2007 feet (hand-level) above sea.....	0 8	33 8
5. Sandstone, massive, coarse, soft, Lower Coalburg	20 0	53 8
6. Fire clay.....	1 0	54 8
7. Shale, sandy.....	16 0	70 8
8. Shale, black, Winifrede Limestone horizon, with <i>Naiadites elongata</i> a (very large individuals) and <i>Lingula kanawhensis</i> a.....	5 0	75 8
9. Coal, Chilton; elevation, 1964 feet (hand-level)	0 6	76 2
10. Fire clay shale.....	3 0	79 2
11. Interval, shale and sandstone.....	29 0	108 2
12. Sandstone, massive, soft, coarse, gray, Hernshaw	25 0	133 2
13. Interval, shale and concealed, to Henry McQueen No. 1 (23) Well in floodplain of Brushy Fork of Muddlety Creek	42 0	175 2

Locality 146. J. D. Lambert abandoned farm mine, No. 309 on Map II; the coal was formerly obtained by "stripping" the overburden in the bed of Back Fork of Beaver Creek; section by the writer:

	Thickness.	Total.
	Ft. In.	Ft. In.
1. Soil .....	.. ..	.. ..
2. Coal, (reported 2 feet thick) Stockton "A" (Upper Mercer)	2 0	2 0
3. Concealed (thickness apparently not more than 2 feet).....	2 0	4 0
4. Shale, black, fissile, Kanawha Black Flint horizon , marine fossils abundant; elevation, 2220 feet (barometer) above sea; thickness about.....	1 0	5 0
5. Coal, Stockton (Lower Mercer) , concealed in water, (reported 2 ft. 2 in. thick)...	2 2	7 2
6. Shale, dark.....		

Locality 147. An incomplete exposure of dark shale at a sulphurous seepage in a small ravine. The shale bears plant fossils in the upper and lower portions of the exposure with a median fossiliferous zone, the faunal succession, in descending order, as determined by the writer, the thickness not being recorded, being as follows:

Shale, Winifrede Limestone horizon:

1. *Plantae*.
2. *Lingulae*; elevation, 1920 feet (barometer) above sea.
3. Abundant marine fossils in a thin zone.
4. *Lingulae* and *Naiadites elongata*.
5. *Plantae*.

Locality 148. Section by the writer, of outcrop of coal and shale on land of G. W. Craig, coal crop, No. 497 on Map II:

	Thickness.	Total.
	Ft. In.	Ft. In.
1. Shale, black, fissile, Dingess, <i>Deltopecten flabellum</i> aa , elevation, 1915 feet (barometer) above sea.....	3 0	3 0
2. Coal, Williamson { visible .....0' 6" } { reported ...0 4 }	0 10	3 10

Locality 149. Section in public road, measured with aneroid barometer by D. B. Reger and the writer (described above by Reger under discussion of the Eagle Shale, with analyses of Nos. 1 and 3):

	Thickness.	Total.
	Ft. In.	Ft. In.
1. Shale, dark, visible..... 10' 0" }		
2. Sandstone, fossiliferous, elevation, 1795 feet (barometer) above sea..... 0 4 } Eagle Shale	15 4	15 4
3. Shale, dark..... 5 0 }		
4. Sandstone, shaly.....	5 0	20 4
5. Fire clay shale, streak, Lower War Eagle Coal horizon.....	.. ..	.. ..
7. Sandstone, Lower Gilbert , visible.....	10 0	30 4

Locality 150. The following is taken from the Lockwood Section of D. B. Reger (Chapter IV) with a note by the writer on the position of the fossils:

	Thickness. Ft. In.	Total. Ft. In.
1. Eagle Coal.....	.. ..	.. ..
2. Concealed	55 0	55 0
3. Sandstone, visible.....	3 6	58 6
4. Coal, Little Eagle ; elevation, 1375 feet (barometer) above sea; visible.....	1 6	60 0
5. Concealed	10 0	70 0
6. Shale, dark, Eagle , in public road; fossils from upper 5 feet and from a thin zone near base; elevation, 1350 feet (barometer) above sea.....	15 0	85 0

Locality 151. Section by D. B. Reger at coal prospect No. 480 on Map II:

	Thickness. Ft. In.	Total. Ft. In.
1. Shale, dark, Dingess , marine fossils abundant	5 0	5 0
2. Coal, soft.... 0' 3" } 3. Shale, black. 0 1 } 4. Coal, soft.... 1 1 } Williamson Coal ; 5. Shale, black. 0 1 } elevation, 1015 feet 6. Coal, soft.... 0 8 } (barometer) above 7. Shale, gray.. 0 8 } sea. 8. Coal, bony... 0 2 } 9. Shale, gray... 0 3 } 10. Coal 0 4 }	3 7	8 7
11. Fire clay shale.....		

Locality 152. Section measured by D. B. Reger and the writer at Tioga Lumber Co. coal prospect, No. 311 on Map II:

	Thickness. Ft. In.	Total. Ft. In.
1. Shale, black, Kanawha Black Flint horizon , marine fossils; elevation, 2070 feet (barometer) above sea.....	4 0	4 0
2. Shale, black, plant fossils.....	1 0	5 0
3. Coal 0' 9½" } Stockton (Lower 4. Shale, gray. 0 3 } Mercer) 5. Coal 0 5½ } Coal	1 6	6 6
6. Shale, gray.....		

Locality 153. Section measured by the writer:

	Thickness. Ft. In.	Total. Ft. In.
1. Shale, fossiliferous, Winifrede (or Dingess?) horizon , <i>Lingula kanawhensis</i> a and <i>Deltopecten flabellum</i> a; elevation, 1930 feet (barometer) above sea.....	4 0	4 0
2. Coal, Chilton ; visible.....	0 8	4 8
3. Concealed		

Locality 155. Section measured in public road by the writer:

	Thickness.	Total.
	Ft. In.	Ft. In.
1. Shale, black, Dingess , marine fossils 3 feet above base; elevation, 1885 feet (barometer) above sea.....	5 0	5 0
2. Coal, Williamson	0 6	5 6
3. Shale, gray.....		

Locality 157. Section measured by the writer at K. B. McCue farm mine, No. 659 on Map II:

	Thickness.	Total.
	Ft. In.	Ft. In.
1. Shale, weathered, soft, light, <i>Naiadites elongata</i> ; elevation, 1880 feet (barometer) above sea.....	4 0	4 0
2. Coal, soft, 2 or 3 paper-thin partings 1' 6 " } No. 2 Gas Bench		
3. Shale 0 1½ } of the Campbell	2 11	6 11
4. Coal, visible..... 1 3½ } Creek Coal		
5. Coal, concealed in water		
6. Shale		

Locality 159. Section measured by the writer at coal prospect of G. W. Craig, No. 292 on Map II:

	Thickness.	Total.
	Ft. In.	Ft. In.
1. Shale, Kanawha Black Flint horizon, <i>Naiadites elongata</i> c; elevation, 2125 feet (barometer) above sea.....	. . .	. . .
2. Coal, hard, some cannel coal in base; reported	2 0	2 0

Locality 160. Section measured by the writer:

	Thickness.	Total.
	Ft. In.	Ft. In.
1. Sandstone, massive.....		
2. Shale, light.....	3 0	3 0
3. Shale, dark, Stockton (Cannelton) Limestone horizon, <i>Naiadites elongata</i> ; elevation, 1880 feet (barometer) above sea	0 6	3 6
4. Shale, light.....	3 6	7 0
5. Coal, reported.....	1 6	8 6

Locality 161. Section measured by D. B. Reger:

	Thickness.	Total.
	Ft. In.	Ft. In.
1. Sandstone		
2. Shale, dark, laminated, with limestone "turtleback" concretions, Dingess , <i>Dellopecten flabellum</i> a; elevation, 1475		

feet (barometer) above sea; to creek level 15 0 15 0

Locality 162. Section by D. B. Reger at coal exposure No. 481 on Map II:

	Thickness.	Total.
	Ft. In.	Ft. In.
1. Shale, dark, Dingess , with marine fossils	5 0	5 0
2. Coal 0' 6" } Williamson Coal ;		
3. Shale, gray. 0 3 } elevation, 915 feet	1 3	6 3
4. Coal 0 6 } (barometer) above sea		
5. Fire clay shale.....	1 0	7 3
6. Sandstone, to creek level.....	10 0	17 3

Locality 163. Section by D. B. Reger at coal prospect No. 273 on Map II:

	Thickness.	Total.
	Ft. In.	Ft. In.
1. Shale, black, Kanawha Black Flint horizon , marine fossils abundant; elevation, 1850 feet (barometer) above sea....	3 0	3 0
2. Coal, soft.. 0' 7" } Stockton (Lower Mer-		
3. Shale, gray 0 9 } cer) Coal	2 9	5 9
4. Coal, hard. 1 5 }		
5. Shale		

Locality 164. Section by D. B. Reger at coal prospect No. 491 on Map II:

	Thickness.	Total.
	Ft. In.	Ft. In.
1. Shale, black, Dingess , with a restricted marine fauna		
2. Coal 0' 0½"		
3. Shale, dark. 0 2½ } Williamson Coal ;		
4. Coal 0 1 } elevation, 1280 feet	2 3	2 3
5. Shale, dark. 0 9 } (barometer) above		
6. Coal, soft... 1 0 } sea		
7. Coal, bony.. 0 2 }		
8. Shale and concealed.....	12 0	14 3

Locality 166. Section by D. B. Reger at Mollie Frame farm mine, No. 360 on Map II:

	Thickness.	Total.
	Ft. In.	Ft. In.
1. Sandstone, massive, Coalburg	15 0	15 0
2. Shale, black, Coalburg , <i>Orbiculoidea Capaliformis</i>	0 3	15 3
3. Coal, soft.. 1' 4" } Coalburg Coal ; eleva-		
4. Coal, hard.. 0 4 } tion, 1310 feet (ba-	3 2	18 5
5. Coal, soft.. 1 6 } rometer) above sea		
6. Shale		

Locality 167. Section by D. B. Reger at John Knabb coal prospect, No. 278 on Map II:

	Thickness.	Total.
	Ft. In.	Ft. In.
1. Sandstone, massive.....		
2. Shale, sandy.....	10 0	10 0
3. Shale, black, Kanawha Black Flint horizon, with marine fossils.....	1 6	11 6
4. Coal, splinty. 0' 6" }		
5. Coal, soft.... 0 6 }		
6. Shale, black, bony 1 9 }	4 3	15 9
7. Coal, bony splint 0 7 }		
8. Coal, medium-Soft 0 11 }		
9. Shale and concealed to river level.....	10 0	25 9

Locality 168. Section by D. B. Reger at L. M. Atwood farm mine, No. 298 on Map II:

	Thickness.	Total.
	Ft. In.	Ft. In.
1. Sandstone, massive.....	. . .	. . .
2. Shale, dark, Kanawha Black Flint horizon, <i>Naiadites elongata</i> ("marine fossils" reported here in section of Reger, above by error).....	1 0	1 0
3. Coal 0' 6" }		
4. Shale, gray... 0 3 }		
5. Coal 0 4 }	2 11	3 11
6. Shale 0 1 }		
7. Coal, medium-soft 1 9 }		
8. Shale .....	. . .	. . .

DESCRIPTION OF SPECIES.

(The following abbreviations are used in this report: "a," abundant; "aa," very abundant; "c," common; where no symbol follows the locality number, the species is rare in the collection obtained. All the specimens of these collections are in the Collection of the West Virginia Geological Survey.)

COELENTERATA

SPONGIAE

Genus CLIONOLITHES Clarke.

Clionolithes canna Price.

Plate XXXIV; Fig. 1.

Clionolithes canna. Price, 1916, West Virginia Geol. Survey, Ra-

leigh and Western Por. Summers and Mercer Counties Report, p. 688, pl. xxx, fig. 1.

Conemaugh Series: Brush Creek Limestone, Preston County, West Virginia.

Kanawha Group: Winifrede Limestone, Raleigh County, West Virginia.

Description.—Adhering to a cast of the exterior surface of a brachial valve of *Schizophoria resupinoides* are casts of fine, clavate tubules similar to those upon which the species was based. While some of the tubules branch and anastomose as previously described, others are short and unbranched, ending in a small bulbous expansion. Some of the unbranched tubes are very short, in some cases shorter than the diameter of the tube. A number of the sponge tubules appear to have entered the shell of the brachiopod through the fine, recumbent tubules of the latter. Small mats of tubules not exhibiting the bulbous expansions are found on fragments of unidentified shells. The possession of the bulbous expansions is not here considered to be a specific characteristic and the specimens have all been referred to this species.

Occurrence.—Kanawha Group, KANAWHA BLACK FLINT HORIZON, Locality 146, x; DINGESS SHALE, Locality 151, x; EAGLE SHALE, Localities 149, c, and 150, x.

ECHINODERMATA

ECHINOIDEA

Genus ECHINOCRINUS Agassiz.

Echinocrinus exilis sp. nov.

Plate XXXIV; Fig. 2.

Description.—This species is based upon a cluster of spine fragments which probably belonged to a single individual. The spines have been completely mineralized and are preserved as a dark, pyritiferous material the surface of which is slightly roughened, so that only the form and dimensions of the spines are known, the surface characteristics not being revealed.

Spine delicate; shaft cylindrical, of uniform diameter from the distal end to within a half-millimeter length of the basal collar, where it expands slightly. Collar minute; raised very slightly above the shaft; base about 1 mm. in length, cylindrical, with no crenulations evident; length of spine, 18 to 20 mm. or more; diameter, slightly greater than $\frac{1}{2}$ mm.

These spines most closely resemble those of *E. hallianus* Geinitz but are slenderer and more than twice as long.

Occurrence.—Kanawha Group, DINGESS SHALE, Locality 164, x.

MOLLUSCOIDEA

BRACHIOPODA

Genus *LINGULA* Bruguiere.

Three species of this genus have been identified in the material studied for this report, *L. kanawhensis*, *L. carbonaria*, and *L. lemniscata*. The identifications follow the usage of a former report¹. Only a few identifications of *L. carbonaria* have been made. It is very difficult to distinguish this species from certain forms which I am provisionally placing with *L. kanawhensis*. I am quite uncertain that there are more than two species involved and suspect that all the larger specimens may be regarded as *L. kanawhensis*; since a wide variety of shape is encountered in the shells found at any one locality. All the minute forms, below 5 or 6 mm. in length, have been referred to *L. lemniscata*. The latter varies widely in shape but in each collection there are to be found oval shells very close to the type specimens in outline.

The association of these lingulas with occasional plant fragments was noted at three localities.

¹W. Va. Geol. Survey Report on Webster County, pp. 592-6; 1920.

Genus ORBICULOIDEA d'Orbigny.

Orbiculoidea missouriensis (Shumard).

Dacrydium missouriensis. Shumard, 1858, St. Louis Acad. Sci., Trans., vol. i, p. 221.

Middle Coal Measures: Lexington and Charbonniere, Missouri.

Description.—A few minute specimens are referred to this species, but may be young individuals of *O. capuliformis*, with which they are associated.

Occurrence.—Kanawha Group, DINGESS SHALE, Locality 151, x; EAGLE SHALE, Locality 150, x.

Genus SCHIZOPHORIA King.

Schizophoria resupinoides (Cox)?

Orthis resupinoides. Cox, 1857, Kentucky Geological Survey, vol. iii, p. 570, pl. ix, figs. 1, 1a and 1b.

Coal Measures: Hawesville, Hancock County, Kentucky.

Description.—Large shells referred to this species are associated with smaller ones referred to *S. altirostris*. The relationships of this species have been discussed in a previous report⁸ the usage of which has been followed here.

In some small specimens of *S. resupinoides*, as here interpreted, the mold of the muscular area resembles that of the pedicle valve of the smaller species. In the report referred to above the pedicle valve has been inadvertently referred to as the brachial and vice versa.

One specimen of a brachial valve in a sandstone matrix shows the shell replaced by yellow iron hydrate in which are preserved the fine, recumbent tubules parallel to the lirae. Another specimen from the same locality shows a cast of a brachial valve which was penetrated by the fine tubules of the sponge, *Clionolithes canna*. The sponge tubules in some cases appear to have entered the shell through the recumbent tubules of the brachiopod.

Occurrence.—Kanawha Group, DINGESS SHALE, Locality 151, x; EAGLE SHALE, Localities 149, aa, and 150, c.

⁸West Virginia Geol. Survey, Report on Raleigh and Western Por. Summers and Mercer Counties, 1916, pp. 694-698.

Genus PRODUCTUS Sowerby.

Productus semireticuatus (Martin)

Anomites semireticulatus. Martin, 1809, Petref. Derbiensia, p. 7, pl. xxxii, figs. 1, 2; pl. xxxiii, fig. 4.

Description.—Poorly preserved impressions of the shells of a large productus appear, without much doubt, to belong to this species. The reticulation is well seen on casts of the brachial valve. Fragmentary casts from one locality are referred here with less certainty but belong to a species of similar size and of the same type of sculpture, if not to this species.

Occurrence.—Kanawha Group, KANAWHA BLACK FLINT HORIZON, Localities, 163, ? and 167, x; DINGESS SHALE, Locality 151, c; EAGLE SHALE, Locality 150, ?

Genus COMPOSITA Bronn.

Composita subtilita (Hall).

Terebratula subtilita. Hall, 1852, Stansbury's Expl. and Survey Valley Great Salt Lake of Utah, p. 409, pl. ii, figs, 1a, b. 2a, b. Carboniferous: Missouri River, near Weston.

Description.—Fragmentary and distorted molds of shells of a *Composita* may include more than one form but have all been referred to this common and variable species in the absence of better material.

Occurrence.—Kanawha Group, WINIFREDE LIMESTONE HORIZON, Locality 147, x; EAGLE SHALE, Localities 149, a, and 150, c.

MOLLUSCA

PELECYPODA

Genus SOLENOMYA Lamarck.

Solenomya sp.

Plate XXXIV; Figs. 3 and 4.

Description.—The obverse and reverse molds of a valve apparently belonging to this genus are too imperfect in outline and in the preservation of the surface sculpture to warrant the erection of a new species. It appears to have its closest relationships in the species *S. trapezoides* Meek from which it differs in the number and relative prominence of the observable radiating costae. These are more prominent upon the posterior end of the shell, where four or five such costae may be counted. The growth lines are only faintly preserved.

The outline of the anterior end of the shell is too indistinct for comparison with that of *S. trapezoides* but the posterior end appears to be more symmetrically rounded, above and below, as the posterior margin meets the cardinal and basal margins.

Dimensions: Height, 18 mm.; length, 40 mm.; convexity, slight.

Occurrence.—Kanawha Group, DINGESS SHALE, Locality 151, x.

Genus EDMONDIA DeKoninck.

Edmondia pottsvilliana sp. nov.

Plate XXXIV; Figs. 5, 6 and 7.

Description.—Shell subelliptical, slightly broader posteriorly; moderately convex in the umbonal and central regions, flattening posteriorly, declining more abruptly toward the anterior margin; greatest convexity apparently above the middle; without a defined posterior umbonal ridge; anterior umbonal slope more abruptly rounded on some specimens, but this feature possibly due to compression; ventral margin forming a broad curve, rounding rather rapidly into both anterior and posterior margins; anterior margin convex, rounding more abruptly into the dorsal than into the ventral margin, most extended in its upper one-third; posterior margin rounding more abruptly into the ventral than into the dorsal margin, its greatest extension in the lower one-third of its course, in some specimens sloping rapidly upward and forward into the dorsal margin, which it meets at a very obtuse angle; dorsal margin more straightened than the ventral one; beaks apparently

obtuse, slightly elevated, situated about one-fifth the length from the anterior end; lunule and escutcheon apparently poorly defined. Surface ornamented by fine, concentric growth lines and coarser, rather numerous concentric undulations.

This is a small shell not very closely comparable to any described species of this genus. It is preserved as casts of the exterior and interior in a shale matrix, the casts being somewhat flattened and compressed.

Dimensions of several valves:

Length.	Height.
mm.	mm.
15.5	10.0
15.0	10.0
18.0	12.5
21.0	14.0

Occurrence.—Kanawha Group, EAGLE SHALE, Locality 150, a.

Edmondia? sp.

Description.—Imperfect casts of valves of a small species rather closely resembling small species of *Edmondia*. Too fragmentary for a more definite identification. In form ovate, subquadrate, evenly rounded with the dorsal margin somewhat straightened. Moderately convex; beaks depressed, placed about one-third to one-fourth the length from the anterior end. Surface ornamented by fine concentric lirae and more prominent growth lines.

Dimensions.—Measurements of several imperfect specimens indicate the following probable dimensions:

Height.	Length.
mm.	mm.
6	11
6	11
7	10
7	13
7	13
7	15

It seems likely that the first of the above sets of dimensions most correctly represents the proportions of this shell.

Occurrence.—Kanawha Group, KANAWHA BLACK FLINT HORIZON, Locality 146, a.

Genus PARALLELONDON Meek.

Parallelodon sp.

Description.—A poorly preserved cast of the interior of a small shell belonging to this genus and resembling small individuals of *P. obsoletus*.

Occurrence.—Kanawha Group, EAGLE SHALE, Locality 150, x.

Genus CONOCARDIUM Brown.

Conocardium nicholasensis sp. nov.

Plate XXXIV; Figs. 8 and 9.

Description.—Shell minute, pentagonal, convex, length slightly greater than the height, greatest convexity in the middle of the valve. Beaks small, apparently projecting very little, if at all, above the hinge line. Hiatus short and apparently narrow. Shell divided into three triangular segments by two radiating costae which are slightly more prominent and keel-like than the others which ornament the surface. The more prominent of these two is situated anteriorly to the median line of the shell and forms an abrupt angulation separating a sharply depressed, concave, anterior alation from the central, convex portion of the shell. Posterior to the median line a rib, slightly less prominent than the first, forms a less prominent angulation and serves to set off from the median region a convex posterior area which is considerably more produced and alate in form than the anterior region and which becomes somewhat flattened near the posterior dorsal angle. The margins of these three triangular areas are all more or less curved, except the posterior dorsal margin which is straight and in length more than one-half that of the shell. This margin forms an acute angle with the posterior lateral margin which is very slightly convex and slopes downward and forward to the ventral margin where it meets the prominent rib previously noted. This margin is greater in length than

the posterior dorsal margin. The ventral margin is shorter than the two previously described, is broadly and evenly rounded, and forms an obtuse angle with the posterior lateral margin. It meets the anterior lateral margin at an angle which is only slightly greater than a right angle. Anterior lateral margin short, concave, meeting the dorsal margin in a short acumination. Anterior dorsal margins slightly concave, and slightly longer than the last, meeting the posterior dorsal margin in an obtuse angle. The sculpture of the surface of the shell consists of three elements which are variously emphasized upon the three areas into which the shell is divided. The more prominent of these sculptural elements are the radiating costae or ribs which are anteriorly concave in direction and are rounded, expanding as they approach the ventral margin. Upon the median portion of the shell, between the two more prominent and keel-like ribs which subdivide it, there are three costae of about the same size while anterior to these are three shorter, fainter ribs grouped into a small bundle. Upon the anterior alation only one radiating rib is developed and it is somewhat interrupted and discontinuous where it is crossed by the undulations of growth. Upon the posterior region there are ten costae, three of which nearest the dorsal margin, situated upon the depressed and nearly flattened portion of this region, are fainter than the others. Crossing the ribs are irregular, concentric growth undulations which are more prominent and well-developed toward the ventral margin; they are also more distinct upon the anterior alation than elsewhere. Parallel to the growth undulations and crossing both the ribs and the spaces between are fine, closely spaced lirae which become much fainter upon the anterior region.

Dimensions: Length, 4 mm.; height, 3.5 mm.; convexity, 1 mm.

This species is known only from casts of the exterior and interior of a single right valve.

Occurrence.—Kanawha Group, EAGLE SHALE, Locality 149, x.

Genus SCHIZODUS King.

Shells of large and medium sized individuals have been referred to two species of this genus. The fragmentary and crushed condition of the molds renders the determinations uncertain. Among the smaller individuals none is sufficiently well preserved to permit even a tentative specific identification.

Genus DELTOPECTEN Etheridge.*Deltopecten flabellum* Price.

Deltopecten flabellum. Price, 1916, W. Va. Geol. Survey, Report, Raleigh and Western Por. Summers and Mercer Counties, p. 720, pl. xxxi, figs. 3-6.
Kanawha Group: Wyoming County, West Virginia.

Description.—Numerous examples of this species occur as casts and molds.

An unusually large specimen, which has one margin broken, shows a height of 14 mm. and a length (perpendicular to height) of more than 30 mm.

Occurrence.—Kanawha Group, KANAWHA BLACK FLINT HORIZON, Locality 146, ?; WINIFREDE LIMESTONE HORIZON, Locality 153, a; DINGESS SHALE, Localities 148, aa, 154, c, 155?, and 161, a.

Deltopecten sp.

Plate XXXIV; Figs. 10 and 11.

Deltopecten sp. Price, 1916, West Virginia Geol. Survey, Report on Raleigh and Western Por. Summers and Mercer Counties, p. 722, pl. xxxi, figs. 7 and 8.
Pennsylvanian: Kanawha Group, Eagle Limestone, at Swope, Wyoming County, West Virginia.

Description.—Casts of the exterior and interior of a right valve which is similar to a previously described right valve from Wyoming County. From this specimen it differs only in being slightly larger.

Occurrence.—Kanawha Group, WINIFREDE LIMESTONE HORIZON, Locality 147, x.

Dellopecten sp. A.

Description.—Imperfect casts of small valves having surface sculpture of the type of *Dellopecten eaglensis* Price or *Aviculipecten pellucidus* Meek and Worthen. There seems to be only one species represented by the material.

Occurrence.—Kanawha Group, KANAWHA BLACK FLINT HORIZON, on the line between Webster and Nicholas Counties, Locality 152, x; DINGESS SHALE, Locality 151, c; EAGLE SHALE, Localities 149, x, and 150, x.

Genus STREBLOPTERIA M'Coy.

Streblopteria tenuilineata Meek and Worthen.

Pecten tenuilineatus. Meek and Worthen, 1860, Acad. Nat. Sci. Philadelphia, Proc., p. 452.
Upper Coal Measures: South line of Clinton County, Illinois.

Description.—The casts of the interior and exterior of a right valve which very closely resemble Meek's species in size and outline, are referred to it without much hesitation in spite of their rather indistinct condition.

Occurrence.—Kanawha Group, DINGESS SHALE, Locality 151, x.

Genus ALLERISMA King.

Allerisma terminale Hall.

Allerisma terminalis. Hall, 1852, Stansbury's Exped. Great Salt Lake, p. 413, pl. ii, figs. 4a, b.
Carboniferous: Big Blue River.

Description.—Several imperfect casts of large, transversely elongated shells with coarse growth undulations.

Dimensions of three important specimens:

Height mm.	Length (perpendicular to height) mm.
26 (plus)	60 (plus)
33 (plus)	85 (plus)
40	95

Occurrence.—Kanawha Group, KANAWHA BLACK FLINT HORIZON, Locality 146, c, Nicholas County, and Locality 152, x, on the line between Webster and Nicholas Counties; DINGESS SHALE, Locality 151, c, Nicholas County.

GASTROPODA

Genus **BELLEROPHON** Montfort.

Bellerophon crassus Meek and Worthen?

Bellerophon crassus. Meek and Worthen, 1860, Acad. Nat. Sci. Philadelphia, Proc., p. 458.
Lower Coal Measures: Pittsburg, St. Clair County, Illinois.

Description.—A fragment larger than the shells which in former reports have been referred to Girty's variety *wewokanus*. The band appears to have been slightly depressed near the aperture. The fragment is too imperfect to make an exact specific determination.

Occurrence.—Kanawha Group, KANAWHA BLACK FLINT HORIZON, Locality 146, x.

Genus **ACLISINA** DeKoninck.

Aclisina stevensiana Meek and Worthen?

Turritella ? ? Stevensana Meek and Worthen, 1886, Geol. Survey. Illinois, vol. ii, p. 382, pl. 27, figs. 8-8a.
Upper Coal Measures: North Branch Saline Creek, Gallatin County, Illinois.

Description.—A tiny shell-mold having the proportions of this species can not be definitely placed specifically because the surface markings are unknown. There are to be seen in a strong cross light suggestions of fine revolving lines on some volutions. Ten rounded volutions may be counted in the spire.

Dimensions: Height of shell, 7 mm.; largest volution: height, 1.5 mm.; width, 1.5 mm.

Occurrence.—Kanawha Group, DINGESS SHALE, Locality 151, x.

CEPHALOPODA

Nautiloidea indeterminata.

Description.—The mold of a fragment of the exterior of a thin-shelled nautiloid showing fine, sinuous striae with parts of two nodes and a second fragment showing no sculpture but having a sharp angulation between the flat umbilical zone and the rounded lateral zone.

Occurrence.—Kanawha Group, EAGLE SHALE, Localities 149, x, and 150, x.

ARTHROPODA

CRUSTACEA

Genus GRIFFITHIDES Portlock.

Griffithides scitulus (Meek and Worthen).

Phillipsia (Griffithides) scitula. Meek and Worthen, 1865. Acad. Nat. Sci., Philadelphia, Proc., p. 270.

Upper Coal Measures: Springfield, Illinois.

Phillipsia scitula. Meek, 1872. U. S. Geol. Survey, Nebraska, Final Report, p. 238, pl. 6, fig. 9.

Upper Coal Measures: Nebraska City, Nebraska; Springfield, Illinois.

Lower Coal Measures: Illinois.

Phillipsia (Griffithides) scitula. Meek and Worthen, 1873, Geol. Survey, Illinois, vol. v, p. 612, pl. 32, fig. 3.

Upper Coal Measures: Springfield, Illinois.

Description.—Casts of two pygidia of this small species were found in a matrix of fine-grained sandstone. Neither is entire and the impression of the exterior surface is not sufficiently sharp to make it clear whether granules were present. The two casts are undoubtedly of shells of the same species and they resemble Meek's specimens as closely as I am able to determine from the description and illustrations. There appear to have been six or seven plications upon the lateral lobes and eight to ten upon the median lobe. The uncertainty in the number of plications arises from the fact that they become nearly obsolete posteriorly.

Dimensions: Length of pygidium, 4 mm.; breadth, 6.5 mm.; convexity (at least), 2 mm.

Occurrence.—Kanawha Group, EAGLE SHALE, Locality 149, x.

VERTEBRATA

PISCES

Fish Scales.

Plate XXXIV; Figs. 12 to 15.

Description.—Four tiny fish scales, two of which are in a fragmentary condition, which were found associated with certain of the invertebrate animals described in the foregoing pages, are illustrated herewith.

Occurrence.—On the line between Nicholas and Webster Counties, Kanawha Group, KANAWHA BLACK FLINT HORIZON, Locality 152, x; Nicholas County, DINGESS SHALE, Locality 164, x.

DESCRIPTION OF PLATE

PLATE XXXIV

Fig. 1. *Clionolithes canna* Price.....x 5-2/3 774

Short lengths of tubules showing bulbous terminal expansions.
 Tubules sunken in the shell of *Schizophoria resupinoides*
 Cox. Flat threads (heavily shaded in the illustration)
 are rootlets of a modern plant.
 Eagle Shale, Locality 149.

Fig. 2. *Echinocrinus exilis* sp. nov.....x 2 775

A spine which apparently preserves its full length.
 Dingess Shale, Locality 164. COTYPE.

Figs. 3 and 4. *Solenomya* sp. near *S. trapezoides*

Meekx I 778

Casts of the interior and exterior surfaces of a right valve
 with the surface exfoliated but showing the radiating
 costae. The outline of the posterior end in Figure 6 has
 been partially restored.
 Dingess Shale, Locality 151.

Figs. 5, 6 and 7. *Edmondia pottsvilliana* sp. nov.....x I 779

Casts of the interior of several left valves. The specimens
 illustrated in Figure 6 include the cast of the exterior of a
 right valve and have been somewhat flattened.
 Eagle Shale, Locality 150. COTYPES.

Figs. 8 and 9 *Conocardium nicholasensis* sp. nov...x 6-2/3 781

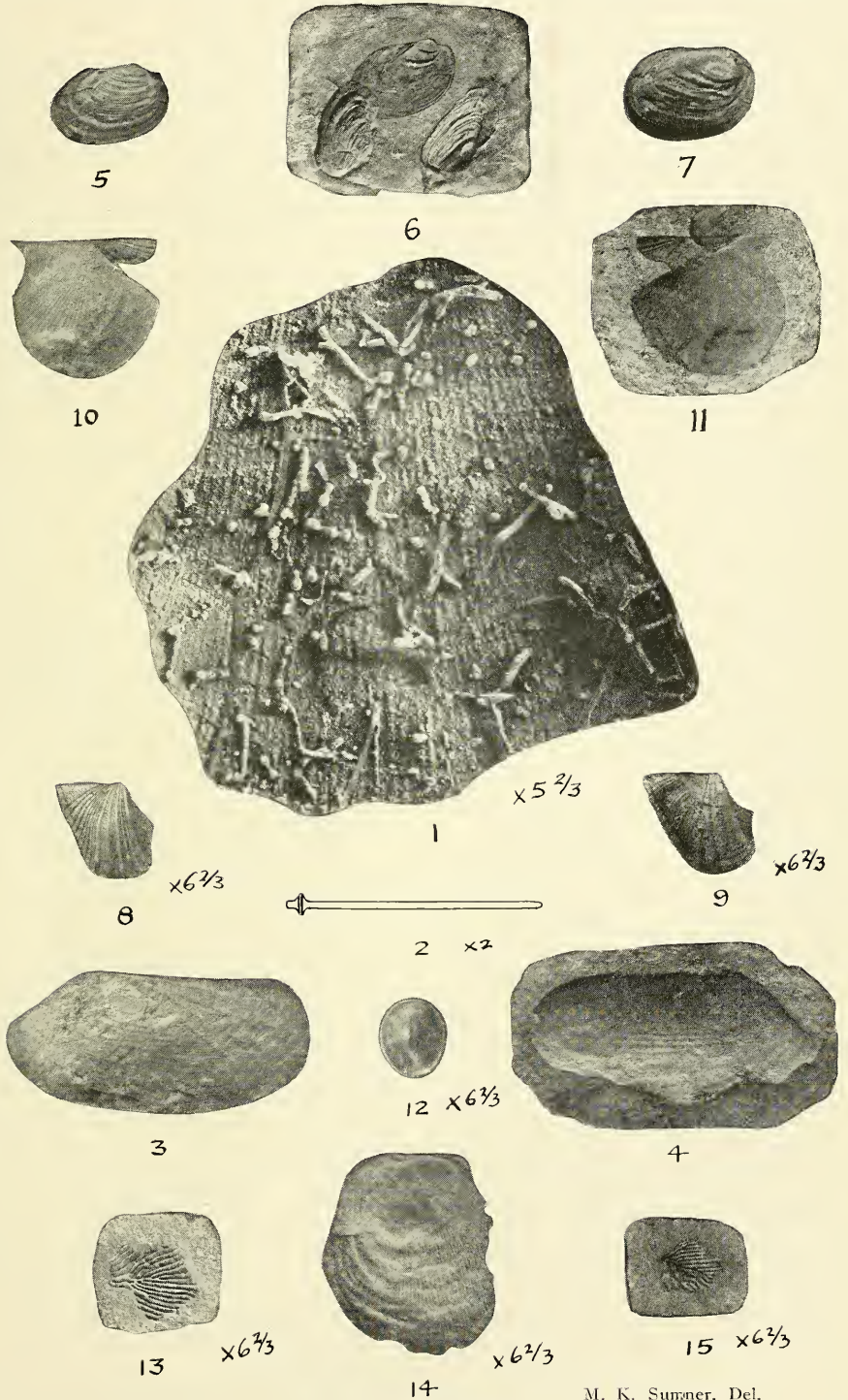
8. Cast of the interior of a right valve.
 9. Clay "squeeze" of the exterior of the same specimen.
 Eagle Shale, Locality 149. HOLOTYPE.

Figs. 10 and 11. *Deltopecten* sp. Price.....x I 783

Casts of the interior and exterior of a right valve. Figure 11
 is from a clay squeeze of the exterior.
 Winifrede Limestone horizon, Locality 147.

Figs. 12 to 15. *Fish scales*.....x 6-2/3 787

12. Kanawha Black Flint horizon, Locally 152.
 13-15. Dingess Shale, Locality 164.



M. K. Summer, Del.

Kanawha Group (Pottsville) Fossils.

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APPENDIX.

Levels Above Mean Tide.

RAILROAD LEVELS.

THE BALTIMORE AND OHIO RAILROAD.

West Virginia and Pittsburgh Branch.

Distances from Clarksburg	Stations.	County	Elevation
102.4	Camden-on-Gauley.....	Webster..	2029.30
103.4	Allingdale.....	Nicholas..	2028.90
110.0	Cranberry (Junction, Logging R. R.)..	Nicholas..	1943.80
111.8	Curtin.....	Nicholas..	1916.90
115.3	Holcomb.....	Nicholas..	2041.90
121.0	Richwood.....	Nicholas..	2199.80

THE CHESAPEAKE AND OHIO RAILROAD.

Gauley Branch.

Miles from Gauley	Stations.	County	Elevation
0.0	Gauley.....	Fayette..	733
1.4	K. & M. Junction.....	Fayette..	673
7.3	Belva.....	Fayette..	711
12.7	Vaughan.....	Nicholas..	803
14.5	Greendale.....	Nicholas..	949

U. S. GEOLOGICAL SURVEY LEVELS.*

CLAY QUADRANGLE.

From Elk Creek east via Lockwood on Otter Creek to Zela.

Feet

Lockwood, 0.1 mile east of, north of road opposite L. N. Simm's house, 200 feet east of R. L. Dickson's house, at east foot of Summers hill, in ledge of rock; bronze tablet stamped "1088 Knwa".....	1,087.741
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*From Bulletin 632, U. S. Geological Survey, 1916.

	Feet
Near Drennen.	
Drennen , 0.4 mile south of post-office, 200 feet north of house, on upper side of road, 50 feet southeast of spring by roadside, east of road, on sandstone outcrop; chiseled square marked "1289".....	1,288.27
From Upper Leatherwood south via Leatherwood and Twentymile Creeks to Belva.	
Morocco , 8.56 miles south of, 30 feet west of county road, about one-third way to top of hill on road from Leatherwood Creek to Twentymile, at Clay-Nicholas County Line. in solid sandstone boulder, among the roots of large leaning beech tree; aluminum tablet stamped "1266"	1,266.997
Vaughan , 7.73 miles northeast of, 12 feet east of edge of creek at road crossing, 600 feet north of mouth of Boardtree Branch, on sandstone boulder; chiseled square, marked "1019".....	1,020.40
Boardtree Branch , 0.82 mile west of mouth, 6.78 miles northeast of Vaughan Post-office, 10 feet east of narrow-gage railroad track, 30 feet east of creek in sharp bend of stream, on outside of long curve in railroad track, in rock; aluminum tablet stamped "993".....	994.234
Boardtree Branch , 2.82 miles west of, 4.88 miles northeast of Vaughan Post-office, 20 feet south of track, at north edge of county road at creek crossing, in root of north side of leaning white-oak tree; spike, marked "929" (elevation 7.8 feet above low water at crossing).....	929.93
Vaughan , 3.8 miles northeast of, 10 feet north of railroad, 300 feet north of county road, 350 feet north of creek, in solid inclined sandstone boulder; aluminum tablet stamped "904".....	905.517
Vaughan , 1.59 miles northeast of, 10 feet north of railroad, 40 feet north of sharp curve in creek, near road crossing, 600 feet west of point opposite dwelling, 2 feet below coal horizon, on sandstone outcrop; chiseled square, marked "860".....	860.97
Vaughan , 0.22 mile east of post-office, at upper side of county road, 50 feet north of mouth of hollow extending northeast to Walker Knob, near north end of lumber yard in Vaughan, 30 feet north of Chesapeake & Ohio Ry. track, in sandstone outcrop; aluminum tablet stamped "810".....	811.034
Vaughan , 0.8 mile southwest of, in north edge of creek, 20 feet south of Chesapeake & Ohio Ry., 150 feet north of county road, 1,200 feet east of mile-post marked "G-12" on east side and "G-13" on west, on large boulder; chiseled square, marked "789".....	790.32
Vaughan , 3.3 miles southwest of, in railroad cut, 10 feet north of railroad, opposite mouth of Dorsey Branch, 250 feet north of residence of C. D. Backus, in face of thick sandstone outcrop; aluminum tablet stamped "739"....	740.668
Vaughan , 3.8 miles southwest of, 3.89 miles northeast of Belva station, 10 feet north of railroad, 60 feet north	

of creek and road, nearly opposite residence on south side of creek, 60 feet west of north end of wooden foot-bridge across Twentymile Creek, on sandstone outcrop; chiseled square, marked "725"..... 726.44

COWEN QUADRANGLE.

From Birch River Post-office southeast up Birch River to Welch Glade, thence southwest to Craigsville.

Boggs, near post-office, 250 feet east of school, 20 feet north of road, in outcrop of rock; bronze tablet stamped "1555 Knwa".....	1,555.797
Welch Glade, about 1 mile northwest of, 725 feet southeast of road from top of mountain to Cowen and Glade Run, about 500 feet southeast of house and 0.25 mile northwest of church on east side of road, in rock; bronze tablet stamped "2253 Knwa" (reported in 1915 as destroyed)	2,254.137
Lanes Bottom (near Camden-on-Gauley), at "The Camden" in west side, in pier to porch; bronze tablet stamped "2062 Knwa" (reported in 1915 as destroyed).....	2,062.872
Craigsville, near east end of, 670 feet east of Cranberry road and hotel, north of road in front of Macon Rose's house; bronze tablet stamped "2288 Knwa" (reported in 1915 as destroyed; drill hole remains).....	2,289.033

From Craigsville along highways up Beaver Creek to Delphi, thence west down Muddlety Creek to Hookersville.

Hokersville, 5 miles east of, 225 feet east of fork of Muddlety, at crossing of Righthand Fork, north of road west of crossing, in overhanging rock; aluminum tablet stamped "2005 Knwa".....	2,005.563
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From Craigsville southeast along highways via Woodbine and Richwood to Manning Knob.

Woodbine, 4.5 miles southeast of, on west side of Greenbrier road, south of trail running west, in hollow near maple tree, in rock; bronze tablet stamped "2969 Knwa"	2,970.667
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From Erbacon south along Baltimore & Ohio R. R. to Fenwick.

Wainville, in east end of south abutment of bridge over Laurel Creek; bronze tablet (not stamped).....	1,572.543
Wainville, in front of sign-post; top of west rail.....	1,576.7
Wainville, 0.7 mile south of, east side of track, in telephone-pole; spike marked "U. S. B. M. 1632".....	1,632.07
Weese, in front of sign-post; top of east rail, marked "U. S. 1721".....	1,721.4
Weese, 0.3 mile south of northwest corner of road crossing, in sign-post; spike marked "U. S. B. M. 1746".....	1,746.08
Arcola, in front of sign-post; top of east rail, marked "U. S. B. M. 1856".....	1,856.6
Arcola, 0.2 mile south of, west side of track, in ledge; bronze tablet stamped "1875".....	1,875.274
Arcola, 1.3 miles south of, east side of track, in telephone-	

	Feet
pole; spike marked "U. S. B. M. 1970".....	1,970.55
Halo (Marcus Post-office), in front of sign-post; top of west rail, marked "U. S. 2080".....	2,080.4
Halo, 300 feet south of station, northeast corner of road crossing, in ledge; bronze tablet stamped "2085".....	2,085.554
Halo, 1.5 miles south of, east side of track, in telephone-pole; spike marked "U. S. B. M. 2214".....	2,215.14
Cowen, in front of station; top of east rail.....	2,244.4
Gauley Mills, in front of platform; top of east rail, marked "U. S. 2035".....	2,035.7
Gauley Mills, 0.5 mile northwest of, on east end of north abutment of wagon bridge over Gauley River; chiseled square, marked "U. S. B. M. 2029".....	2,030.09
Camden-on-Gauley, east side of water-tank, at foot of ladder, in concrete block; bronze tablet stamped "2025".....	2,025.748
Camden-on-Gauley, in front of station; top of east rail.....	2,034.0
Allingdale, in front of station; top of west rail.....	2,022.7
Allingdale, east end of south abutment of bridge "104A"; chiseled square, marked "U. S. B. M. 2021".....	2,021.83
Allingdale, 1 mile south of, west side of track, in telephone-pole; spike marked "U. S. B. M. 2022".....	2,022.36
Allingdale, 2.5 miles south of, east side of track, in ledge; bronze tablet stamped "2018".....	2,018.595
Allingdale, 3.6 miles south of, 60 feet north of north portal of tunnel, west side of track, in telephone-pole, spike marked "U. S. B. M. 2008".....	2,008.19
Allingdale, 4.6 miles south of, west side of track, in telephone-pole; spike marked "U. S. B. M. 1978".....	1,979.08
Cranberry, in front of station; top of west rail.....	1,937.93
Cranberry, in west end of south abutment of bridge over Cranberry River; bronze tablet stamped "1936".....	1,936.806
Cranberry, 1.1 miles south of, east side of track, on ledge; chiseled square, marked "U. S. B. M. 1919".....	1,919.36
Curtin, in front of station; top of south rail.....	1,910.0
Curtin, 285 feet east of station, 10 feet west of switch signal, south side of track, in ledge; bronze tablet stamped "1913".....	1,913.501
Coal Siding, in front of platform; top of west rail.....	1,940.8
Coal Siding, 45 feet south of south end of platform, west side of track, in telephone-pole; spike marked "U. S. B. M. 1940".....	1,940.51
Coal Siding, 1.2 miles south of, west side of track, in telephone-pole; spike marked "U. S. B. M. 1987".....	1,987.56
Holcomb, in front of platform; top of west rail.....	2,026.0
Holcomb, in east end of north abutment of bridge over Morris Creek; bronze tablet stamped "2025".....	2,025.235
 From Richwood northeast 3.6 miles along log railroad (leveled twice).	
Richwood, 2.6 miles north of, east side of track, in boulder; boulder; bronze tablet stamped "2350".....	2,350.491
Richwood, 3.6 miles northeast of, north side of track, in telephone-pole; spike marked "U. S. B. M. 2453".....	2,454.04

From Craigsville southwest along highway to Summersville (1 foot error in this line).

	Feet
Beaver, floor of bridge over Beaver Creek.....	2,110.5
	} 2,111.5
Beaver Creek, surface of water June 21, 1899.....	} 2,102
	} 2,103
Beaver, 2.7 miles southwest of, at the Hicks House, on stone step to stile, marked "2267" on woodwork.....	} 2,268.15
	} 2,269.15
Beaver, 3.7 miles southwest of, 1 mile west of Hicks House, about 800 feet northeast of Horse Run, 300 feet west of house in hollow, at edge of timber, north side of road, in rock; bronze tablet stamped "2140 Knwa" (reported destroyed, 1915).....	} 2,140.287
	} 2,141.287

FAYETTEVILLE QUADRANGLE.

Gamoca, in front of post-office; top of rail.....	685.8
Wyndal, 1.55 miles south of post-office, 1 mile north of Gamoca Post-office, 10 feet south of railroad, 1,000 feet west of mile-post marked "G-5-G-10", on shaly sandstone outcrop; chiseled square, marked "688".....	689.64
Wyndal, in front of post-office; top of rail.....	695.4
Belva, 0.4 mile south of station, 0.6 mile north of Wyndal Post-office, in south face of capstone on east end of south abutment of bridge across Gauley River; shank of old bronze tablet (old bench mark which was stamped "711")	710.006
Belva, in front of station, top of rail.....	706.9
Belva, 2.6 miles northeast of, 20 feet north of railroad, 40 feet south of creek, 220 feet east of point opposite mouth of Bells Creek, on large sandstone boulder; chiseled square, marked "700".....	701.71

From Belva east along Gauley River to Little Elk Creek.

Belva, 4.8 miles east of, 0.5 mile northeast of mouth of Elk Creek, 15 feet northwest of road, in ledge of rock; aluminum bolt stamped "752 Knwa".....	751.540
Lucas (Woods Ferry), 500 feet northwest of post-office, on north side of Gauley River, 130 feet west of Wood's Ferry landing, north of road, in huge conglomerate boulder; aluminum tablet stamped "1006".....	1,005.058
Albion, 1.12 miles east of, 125 feet northeast of Pinegrove Schoolhouse, 150 feet southwest of wooden bridge over branch, north of road, 1 foot above ground, in sandstone outcrop; aluminum tablet stamped "1306".....	1,305.023

GASSAWAY QUADRANGLE.

From Strange Creek southeast to Birch River Post-office.

Strange Creek Post-office, 1 mile southeast of, 50 feet east of road crossing, 300 feet east of Upper Mill Creek, 100 feet east of road forks, on outcrop of sandrock; chiseled square, marked "818".....	818.30
Strange Creek, 2 miles southeast of, south of road in bank, 180 feet west of road crossing, opposite house and hollow, in outcrop of sandrock; aluminum tablet stamped	

	Feet
"879"	878.883
Jennings, 0.5 mile east of post-office, west of railroad, on edge of creek, at west end of trestle; chiseled square, marked "898".....	897.66
Jennings, 2.4 miles southeast of, east of railroad, north of Strange Creek, 70 feet south of house, opposite hollow between trestles, in outcrop of sandrock; aluminum tablet stamped "993".....	993.259
Jennings, 3.6 miles southeast of, 100 feet north of Trace Fork at mouth, east of railroad and creek, on sandrock; chiseled square, marked "1044".....	1,043.13
Jennings, 4.6 miles southwest of, east of road, 300 feet south of road to west, on sandrock; chiseled square, marked "1223"	1,222.78
Jennings, 5.5 miles southeast of, between Ball Schoolhouse and New Hope Church, 10 feet south of road fork, 300 feet west of Morris' store, in hollow between Hughes Mountain and Kenna Mountain, in outcrop of sandrock; aluminum tablet stamped "1253".....	1,252.955
Jennings, 7.6 miles southeast of, 0.5 mile east of Big Birch Ford, opposite hollow to right, north of river, on outcrop of sandrock; chiseled square, marked "1106".....	1.105.36

LOBELIA QUADRANGLE.

Along log railroad.

Richwood, 4.9 miles northeast of, north side of track, in telephone-pole; spike marked "U. S. B. M. 2526".....	2,527.30
Richwood, 6.1 miles northeast of, north side of track, in boulder; bronze tablet stamped "2624".....	2,624.655

RICHWOOD QUADRANGLE.

Snow Hill, 8.8 miles southeast of, at northwest intersection of Nicholas road and road to Nutterville, 500 feet north of Grig McClung's house, in sandstone rock; bronze tablet stamped "3392 Knwa".....	3,393.556
Snow Hill, 6.5 miles southeast of, at angle of Greenbrier-Nicholas County Line; top of corner-stone.....	3,130.57

From point 1.6 miles northwest of Snow Hill northeast to Ophelia, thence southeast to Beech Knob, thence southwest to McClungs.

Ophelia, 0.75 mile south of, 1,500 feet west of crossroads and church, west of farm road, 50 feet north of Summersville road, in rock; copper bolt stamped "2587 Knwa".....	2,588.574
Lile, opposite post-office, west of road, 100 feet west of McMillion Creek, in rock; copper bolt stamped "3121 Knwa"	3,123.138
Grassy Knob, at trail fork, 10 feet north of sign, in large flat rock; aluminum bolt stamped "3581 Knwa".....	3,588.018

From Leivasy northeast along road up and crossing Grassy Creek.

Grassy Creek, about 900 feet east of creek crossing, on north

Feet

side of road up Grassy Creek, in rock; aluminum tablet stamped "2426 Knwa"..... 2,427.284

Near Richwood.

Richwood, 1.75 miles south of, at Greenbrier-Nicholas County Line; top of stone..... 2,875.39

From Fenwick southeast along Baltimore & Ohio R. R. to Richwood (leveled twice).

Fenwick, in front of station; top of west rail, marked "U. S. 2104"..... 2,104.7
 Fenwick, in north end of east abutment of bridge over Cherry River; bronze tablet stamped "2103"..... 2,104.052
 Dain, in front of platform; top of south rail..... 2,168.1
 Dain, 0.5 mile east of, north side of track, on ledge; chiseled square, marked "U. S. B. M. 2176"..... 2,176.37
 Richwood, in front of station; top of south rail..... 2,193.17
 Richwood, 50 feet north of station, in outcrop; bronze tablet stamped "2193"..... 2,194.121
 Richwood, at northeast corner of fence of John Carter's house, in telephone-pole; spike marked "U. S. B. M. 2228" 2,228.46

From Fenwick southwest along highway to Lile.

Fenwick, 1.3 miles south of, east side of track, in stump; copper nail with washer stamped "U. S. G. S. W. Va. B. M." marked "U. S. B. M. 2189"..... 2,189.52
 Saxman, on east end of north abutment of bridge over Laurel Creek; chiseled square marked "U. S. B. M. 2264"..... 2,264.38
 Saxman, 1.6 miles south of, east side of track, in ledge; bronze tablet stamped "2409"..... 2,409.555
 Saxman, 2.9 miles south of, west side of track, on ledge; chiseled square marked "U. S. B. M. 2483"..... 2,483.86
 Saxman, 4.4 miles south of, 260 feet south of log road, east side of road up McMillion Creek, in boulder; bronze tablet stamped "2528"..... 2,529.493
 Lile, 2 miles northwest of, north side of road, on boulder; chiseled square marked "U. S. B. M. 2882"..... 2,885.10
 Lile, 0.8 mile northwest of, 75 feet west of Fallbrook Schoolhouse, north side of road, on ledge; chiseled square marked "U. S. B. M. 3057"..... 3,058.43
 Lile, opposite post-office, west of road, 100 feet west of McMillion Creek, in rock; copper bolt stamped "3121 Knwa" 3,123.138

Near Holcomb.

Holcomb, 1.3 miles south of, east side of track, on boulder; chiseled square, marked "U. S. B. M. 2067"..... 2,068.14

SUMMERSVILLE QUADRANGLE.

From point near Tipton north along highway to point near Drennen.

	Feet
Tipton , 0.46 mile southeast of, 90 feet west of short turn to right (going down Laurel Fork of Peters Creek), 400 feet northeast of house on left side of rock, on north side of road, in south stone outcrop; chiseled point marked "1332".....	1,331.14
From Drennen east along highway to Summersville (leveled twice)	
Zela , 0.1 mile east of, 300 feet west of Crosslanes road, in field 50 feet south, in large sandstone rock; aluminum tablet stamped "1267 Knwa".....	1,267.990
Gilboa Post-office , 60 feet east of, north side of road, in root of tree; copper nail with washer stamped "U. S. G. S. W. Va. B. M.".....	1,289.94
Enon Post-office , 1.1 miles west of, 200 feet west of Wm. Graves's residence, south side of road on ledge; chiseled square.....	1,487.96
Enon Post-office , 150 feet west of, north side of road, in ledge; bronze tablet stamped "1512".....	1,512.199
Summersville , 2.5 miles northwest of, north side of road, on ledge; chiseled square.....	1,569.18
Summersville , 1.3 miles northwest of, north side of road, on outcrop; chiseled square.....	1,759.01
Summersville , east side of door in base of pilaster in front of court-house; aluminum tablet stamped "1894 Knwa".....	1,894.382
From Zela south along highway to point near Keslers Crosslanes (leveled twice).	
Zela , 1.3 miles southeast of, 110 feet south of road forks, east side of road, opposite Whitewater Church, in root of tree; copper nail with washer stamped "U. S. G. S. W. Va. B. M.".....	1,350.72
Zela , 2.6 miles south of, west side of road, in root of tree; copper nail with washer stamped "U. S. G. S. W. Va. B. M.".....	1,522.08
From Summersville northeast along highway to Birch River.	
Hookersville , 200 feet west of road to Powell Mountain, at intersection of road up Muddlety Creek, in field, in rock; aluminum tablet stamped "1859 Knwa".....	1,860.133
Birch River , 4.2 miles southwest of Powell Mountain, opposite road to Strange Creek, in small ledge of rock; aluminum bolt stamped "2249 Knwa".....	2,249.973
Birch River , about 300 feet north of post-office, east of Powell Creek, about 0.25 mile north of mouth of Powell Creek, opposite Ivan Bros. & Brown's store, in outcrop of rock; aluminum tablet stamped "1108 Knwa".....	1,108.565
From Muddlety northwest along road to Buffalo Creek, thence north to Low Gap (leveled twice).	
Muddlety , 7.3 miles northwest of, at crossing, about 2,000 feet north of Beech Fork, south of road, opposite Libertybowl Schoolhouse, in rock; aluminum tablet stamped "1747 Knwa".....	1,747.365

Feet

Libertybowl Schoolhouse , 1.3 miles northwest of, west side of road, in root of tree; copper nail with washer stamped "U. S. G. S. W. Va. B. M.".....	1,774.01
Libertybowl Schoolhouse , 3.1 miles northwest of, 300 feet east of Ed. Hamrick's store, north side of road, in root of tree; copper nail with washer stamped "U. S. G. S. W. Va. B. M.".....	1,700.54

From Summersville east along highway toward Craigsville
(1 foot error in this line).

Haymond , about 1.5 miles east of, about 0.5 mile west of Persinger Creek, at road northeast to Persinger, at southeast angle of road fork, on rock; cut point marked "2025"	} 2,025.86 } 2,026.86

SUTTON SPECIAL QUADRANGLE.

From Heaters south along Baltimore & Ohio R. R. to Sutton, thence along highway and across country to Birch River.

Little Birch , 2 miles west of, 160 feet northwest of Bear Run, 50 feet northwest of road forks, north of road, in outcrop of rock; bronze tablet stamped "1073 Grafton"...	1,072.775
Birch River , 300 feet north of post-office, 0.2 mile south of mouth of Powell Creek, on east side, opposite Ivan Brothers and Brown's store, in outcrop of rock; aluminum tablet stamped "1108 Knwa".....	1,108.565

From Birch River eastward along highway to Erbacon, thence north along Baltimore & Ohio R. R. to Gillespie.

Birch River Post-office , 3 miles east of, 150 feet west of Birch Valley Schoolhouse (No. 24), 170 feet east of ford, north of river and road, in east end of large boulder; aluminum tablet stamped "1186".....	1,186.291
Waggy Post-office , 0.5 mile west of, south of ridge road, 300 feet west of tramroad and water-tank, 0.3 mile east of road forks, in boulder; aluminum tablet stamped "2085".....	2,084.728
Waggy Post-office , 1 mile east of, north of county road, south of tramroad, near summit, 0.4 mile from where tramroad leaves ridge road, in outcrop of rock; aluminum tablet stamped "2176".....	2,176.059

WINONA QUADRANGLE.

From Kesler's Crosslanes along highway south to Carinfex, thence east to Fowler Knob (leveled twice).

Keslers Crosslanes , 600 feet south of store and crossroads, 100 feet south of S. P. Campbell's house, west of road, in ledge; brass bolt stamped "1567 Knwa".....	1,567.998
Keslers Crosslanes , 1.4 miles south of, west side of road, in root of tree, copper nail with washer stamped "U. S. G. S. W. Va. B. M.".....	1,657.26
Keslers Crosslanes , 2.6 miles south of, west side of road, in root of tree; copper nail with washer stamped "U. S.	

	Feet
G. S. W. Va. B. M.".....	1,706.40
Carnifex, north side of Gauley River, 35 feet north of ferry landing, east side of road, in large ledge; bronze tablet stamped "1190".....	1,190.647
Carnifex, 1.6 miles southeast of, east side of road, on ledge; chiseled square	1,813.73
Mount Lookout Post-office, 90 feet east of, north side of road in root of tree; copper nail with washer stamped "U. S. G. S. W. Va. B. M.".....	1,981.20
Mount Lookout, 1 mile southeast of, 250 feet south of schoolhouse, east side of road, in ledge of rock; aluminum bolt stamped "2069 Knwa".....	2,070.448
Pool Post-office, 400 feet north of, east side of road, in root of tree; copper nail with washer stamped "U. S. G. S. W. Va. B. M.".....	2,146.47
Pool Post-office, 1.6 miles east of, south side of road, on ledge; chiseled square.....	2,234.14
Pool Post-office, 3.4 miles east of, at forks of road, in telephone-pole; spike.....	2,354.51
Fowler Knob, 400 feet south of, east of road, just north of small branch, in large ledge of rock; aluminum bolt stamped "2195 Knwa".....	2,196.487
From Fowler Knob along highways southwest to Russellville, thence southeast to Riverside (Meadow River).	
Miller's Ferry (over Meadow River), 0.1 mile north of, east of river, west of road, in ledge of rock; aluminum bolt stamped "1905 Knwa".....	1,905.917
Russellville, 90 feet north of, east of road, west of river, in ledge of rock; aluminum tablet stamped "1900 Knwa".....	1,901.102
Riverside (at Meadow River), 150 feet northwest of, 800 feet east of ford, west of road, between house and barn, in one of several ledges of rock; aluminum bolt stamped "2324 Knwa".....	2,325.219
From Snow Hill west along highway to Fowler Knob.	
Snow Hill, 200 feet southwest of post-office, 535 feet north of road running west, west of Nicholas road, in rock; aluminum bolt stamped "2943 Knwa".....	2,945.090
From Vinton north along highway to point near Tipton.	
Vinton, 250 feet south of, 10 feet south of hollow, on west or upper side of road, 5 feet above grade, on sandstone ledge; chiseled square marked "1377".....	1,376.23
Tipton, 1.5 miles south of, 250 feet north of south foot of Panther Mountain (branch crossing), 30 feet east of road on upper side; on root of hard-maple tree; square cut with nail marked "1430".....	1,429.74
Near Riverside.	
Riverside, 0.2 mile south of, west edge of track; chisel point on boulder, chiseled "2351 U. S.".....	2,351.38

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